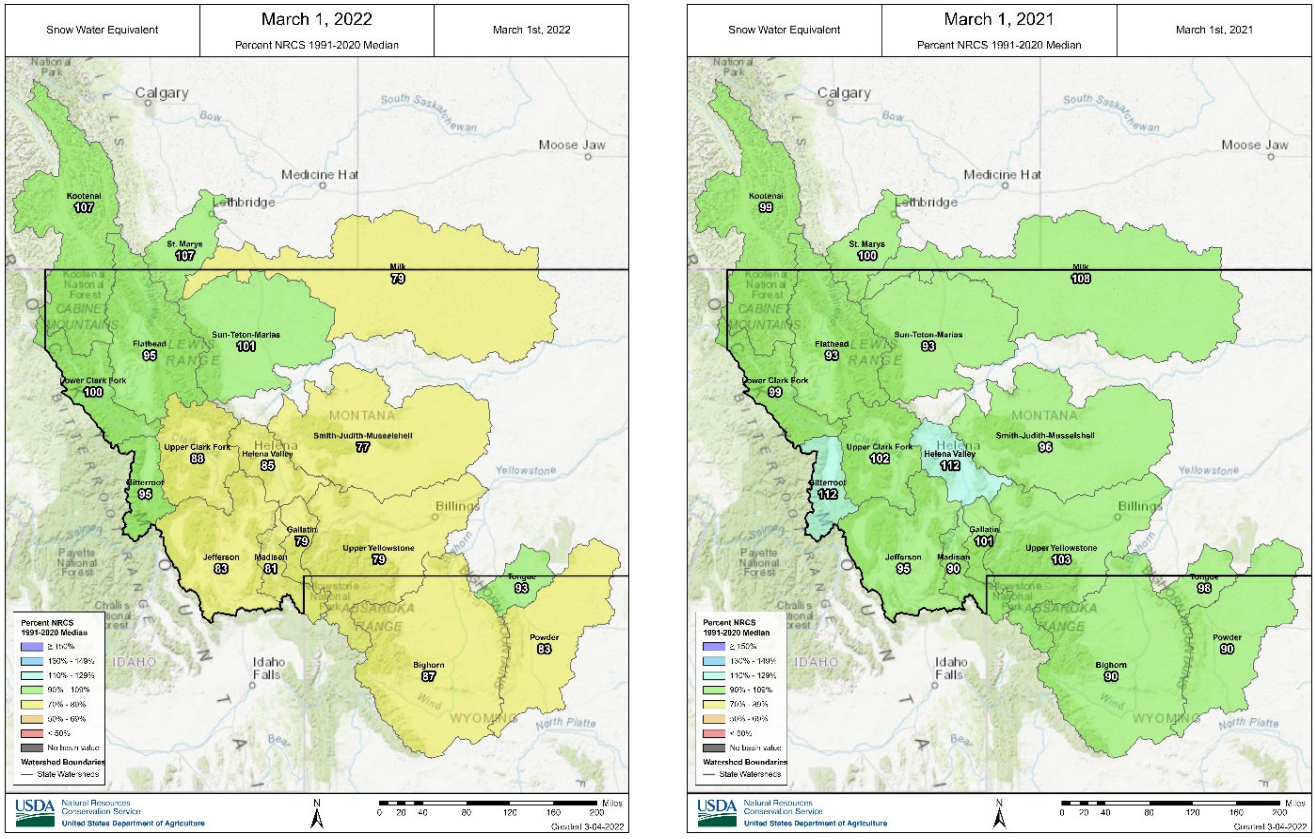
USDA United States Department of Agriculture

Natural Resources Conservation Service

Montana
Water Supply Outlook Report
March 1, 2022



Percent normal SWE on March 1, 2022 (left) and March 1, 2021 (right).

February did not bring the widespread precipitation that we all hoped for in Montana. As a result, most snowpack percentages decreased from last month and are currently below normal. Conditions are generally better west of the Continental Divide than they are to the east and overall snowpack percentages are lower than they were last year on March 1. With only 1 to 2 months remaining in the typical snow accumulation season, a major weather pattern change is needed to make up for snowpack deficits. Meanwhile drought conditions remain in all but northwest Montana.

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Operational News

Extreme Temperatures for March 1 Manual Snow Surveys

Most consumers of data collected by the Snow Survey and Water Supply Forecasting (SSWSF) program in Montana are familiar with the SNOTEL network in our region. The Montana Data Collection Office (MTDCO) operates and maintains 134 SNOTEL sites in Montana, Wyoming and South Dakota. These automated stations provide hourly snowpack, precipitation, snow depth and temperature data. To complement this automated data the MTDCO also operates a network of manual snow measurement sites called snow courses. There are 135 snow courses in our data collection region. Snow courses are accessed by snow surveyors monthly during the winter and snowpack and snow depth data are manually measured. The data is valuable for filling in data gaps and providing a more comprehensive picture of what the snowpack looks like across all elevations.

To ensure snow course data across the region is collected around the same time and can be used in our monthly report a survey window of five working days prior to the first of each month is established. It is a huge collaborative effort by surveyors from the NRCS, other federal and state agencies, and volunteers at the end of each winter month to get out and collect this important data.

At the end of February, in preparation for the March 1 streamflow forecasts and water supply outlook report, staff from the MTDCO headed out to measure eight snow courses located in the Gallatin, Madison, Smith and Big Hole river basins. Conditions for the surveys this past month were anything but “normal”. The approved

Photo on the left is of Eric Larson near the Grasshopper snow course in the Castle Mountains. High temperatures on this survey day did not break 0°F. Photo on the right is of Zach Rich at the trailhead to Foolhen snow course in the Pioneer Mountains a week later. High temperatures that day were nearly 50°F and the crew started the day riding in the rain. Thumbs down to that!

survey window for the recent March 1 surveys was from Tuesday, February 22 to Monday, February 28 which just happened to span the largest temperature swings Montana has seen all winter. According to National Weather Service (NWS) data, the average daily temperature at Bozeman Gallatin Field during that seven day window varied by 48.5 degrees Fahrenheit. Surveyors from the MT Snow Survey Office visited the Grasshopper snow course in the Castle Mountains on Wednesday, February 23 when the maximum temperature that day in White Sulphur Springs was -2 degrees Fahrenheit. Then a week later they found themselves riding snowmobiles in the rain while accessing the Foolhen snow course in the Pioneer Mountains. The maximum temperature in Wise River, MT on that day, Tuesday March 1, was 48 degrees Fahrenheit.

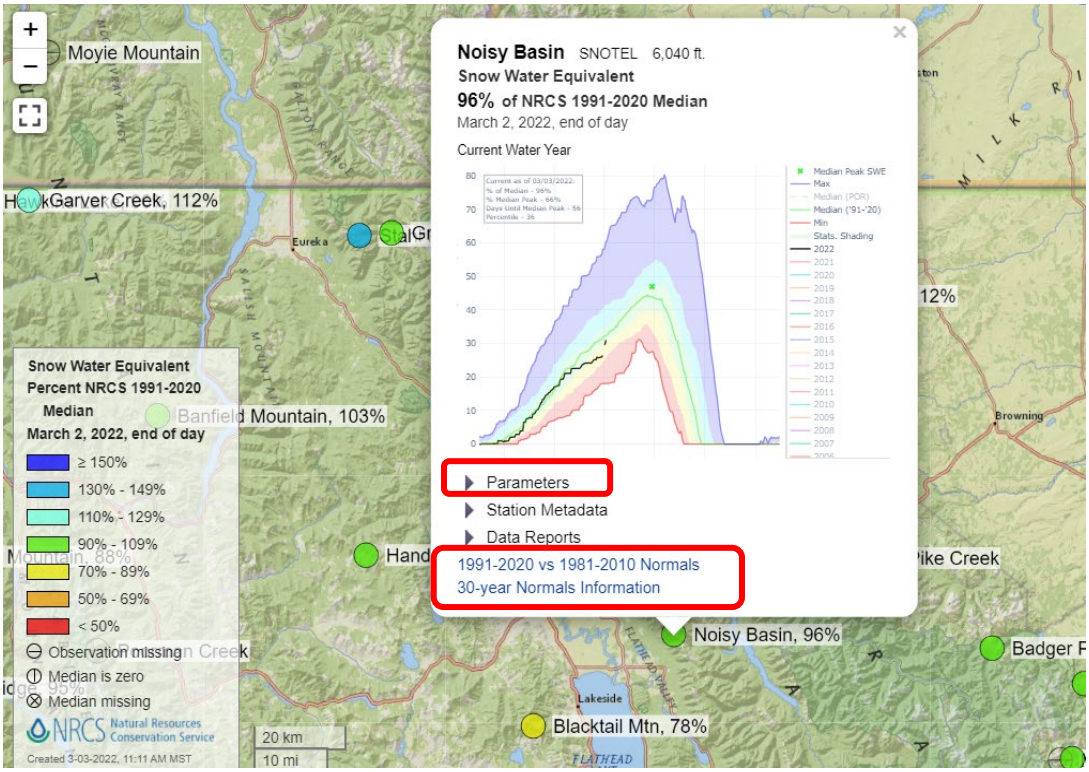
Survey week can bring all sorts of challenges but it's not often that surveyors get to experience frigid temperatures and then temperatures warm enough that it rains instead of snows all while collecting data for the same month.

Snow Survey Product Highlight

Comparing Normals from 1991-2020, 1981-2010, and Period of Record

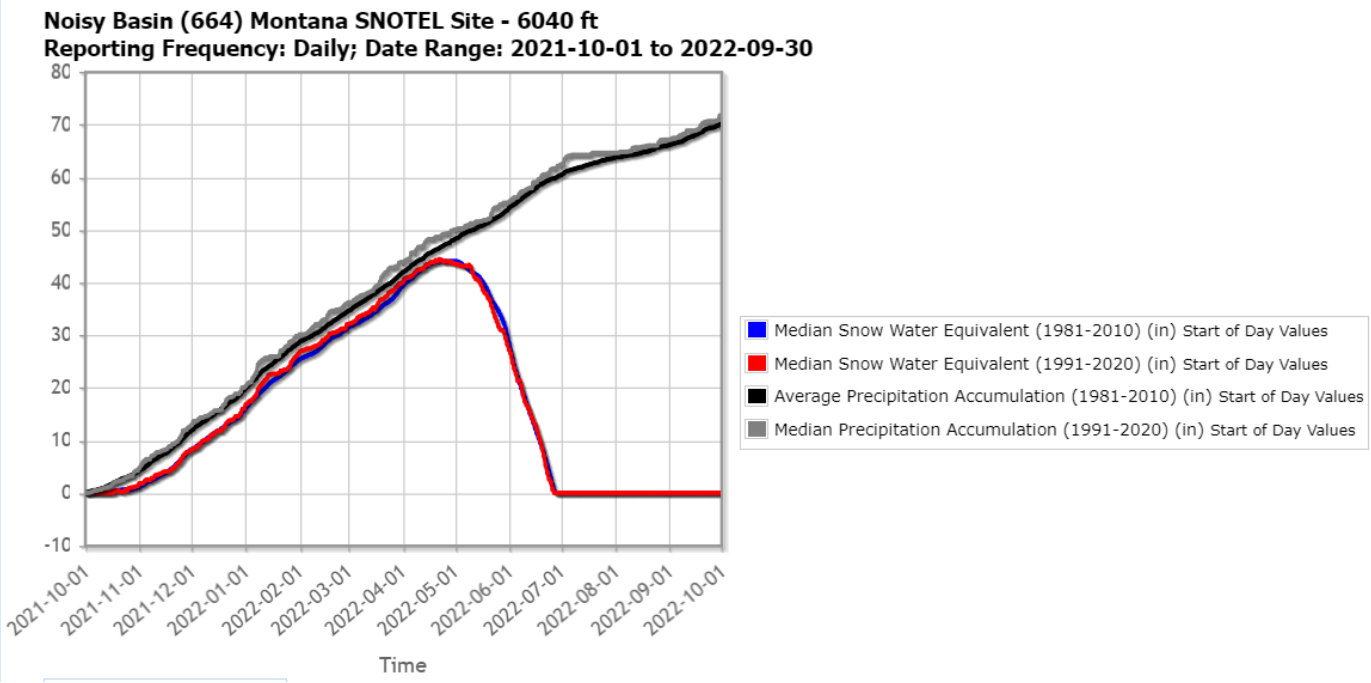
In the January 2022 Water Supply Outlook Report, we discussed the newly calculated 30-year normals for the 1991-2020 period, which follows the World Meteorological Organization (WMO) standards. We have been receiving many questions about how the new normals compare to the 1981-2010 normals and to the entire period of record (POR), and luckily there are data products readily available that can help.

The interactive map is a good place to start as you can easily select the station you're interested in. For example, if you want to compare normals for a SNOTEL, navigate to the SNOTEL or snow course and click on the icon. There are two blue links at the bottom of the pop-up box: "1991-2020 vs 1981-2010 Normals", which compares the two



in graphical form, and “30-year Normals Information”, which gives excellent background about the normals making process.

Clicking on the blue link “1991-2020 vs 1981-2010 Normals” for a given site will take you to the Report Generator tool with a plot of medians and averages for both time periods (see below). Hovering over the lines shows the values for each line for easy comparison. Most normals in Montana did not change significantly between the 1981-2010 and 1991-2020 periods, but it is useful to be able to check for each SNOTEL or snow course.



Another resource for each site is under “Parameters,” which expands to a box that shows the relevant data parameters for what you’ve selected. This section shows current data values and compares it to normals, both the most recent 30-year normal (1991-2020) and the period of record (POR) normal, which in this case has 48 recorded measurements, “# of Observations (POR).” In this example, the POR median is the same as the 1991-2020 median, but that is not always the case.

Parameters

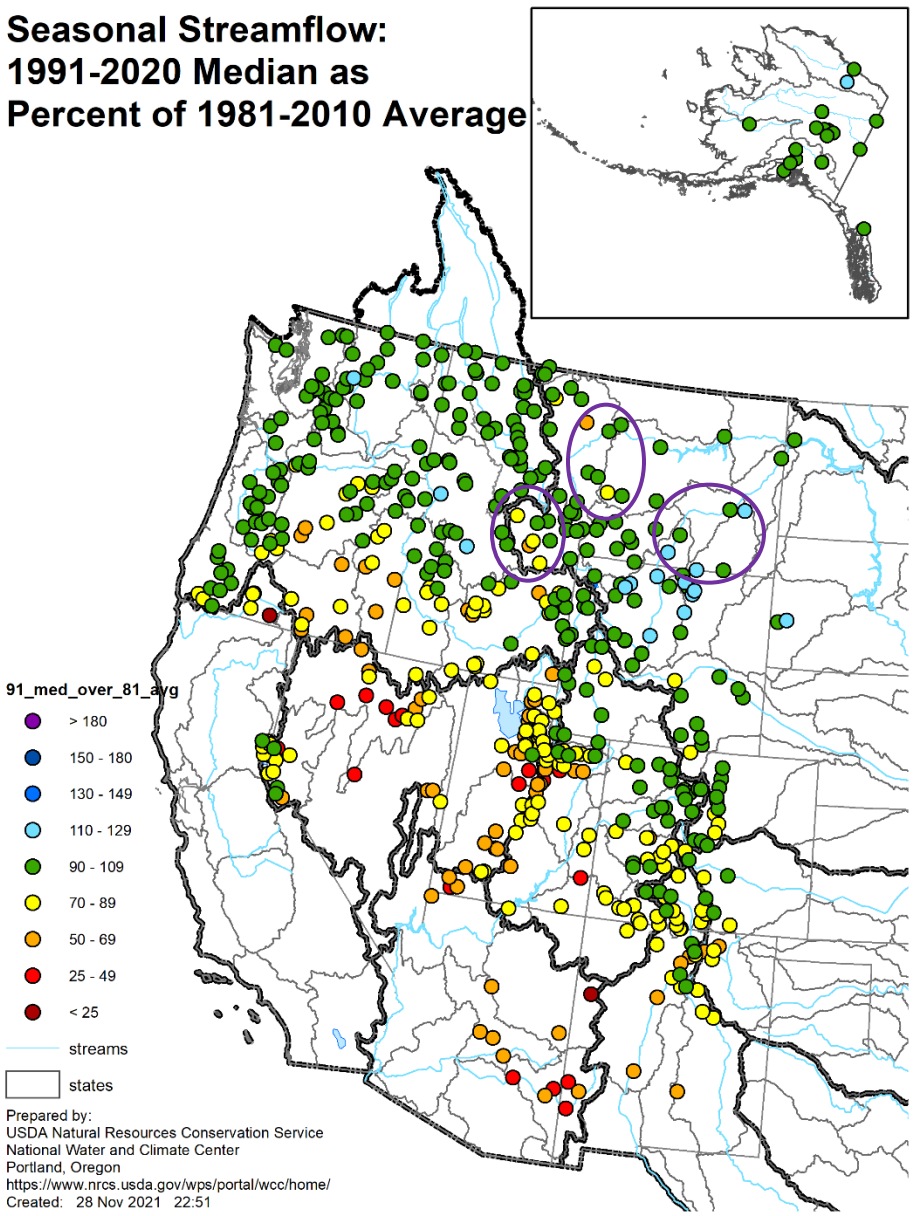
Snow Water Equivalent (inches) on March 2, 2022, end of day			
Value:	31	**Anomaly (POR):**	-1.3
POR Median:	32.3	**NRCS 1991-2020 Median:**	32.3
% of POR Median:	96%	**% of NRCS 1991-2020 Median:**	96%
POR Average:	33.4	**NRCS 1991-2020 Average:**	34.5
% of POR Average:	93%	**% of NRCS 1991-2020 Average:**	90%
% of WY Peak:	100%		
% of Median WY Peak (POR):	66%	**% of NRCS 1991-2020 Median WY Peak**	66%
% of Average WY Peak (POR):	66%	**% of NRCS 1991-2020 Average WY Peak**	65%
Percentile (POR):	36	**# of Observations (POR):**	48
Maximum (POR) (year):	60.4 (1997)	**Maximum Rank (POR):**	31
Minimum (POR) (year):	18.1 (2001)	**Minimum Rank (POR):**	17

How Did the 30-year Streamflow Normals Change?

As of October 1, 2021, all NRCS Snow Survey and Water Supply Forecasting (SSWSF) Program's graphs, maps and reports reference recently updated normals for the 1991-2020 time period. An overview of this update and how it affects snowpack and precipitation data can be found in the January 1 Water Supply Outlook Report.

As part of this shift to a new 30-year time period the streamflow normals, which are used to compare the streamflow forecasts to each month, were also updated to use the median as the default measure of central tendency.

This change had major impacts to the streamflow normals in some parts of the west. Specifically in the river basins of the southwest, many of the new normals (1991–2020) are less than 50% of the previous normals (1981–2010) that were calculated using the average as the measure of central tendency. The map to the right shows all stream gages that the NRCS issues forecasts for with the new normals as a percent of the previous normals.



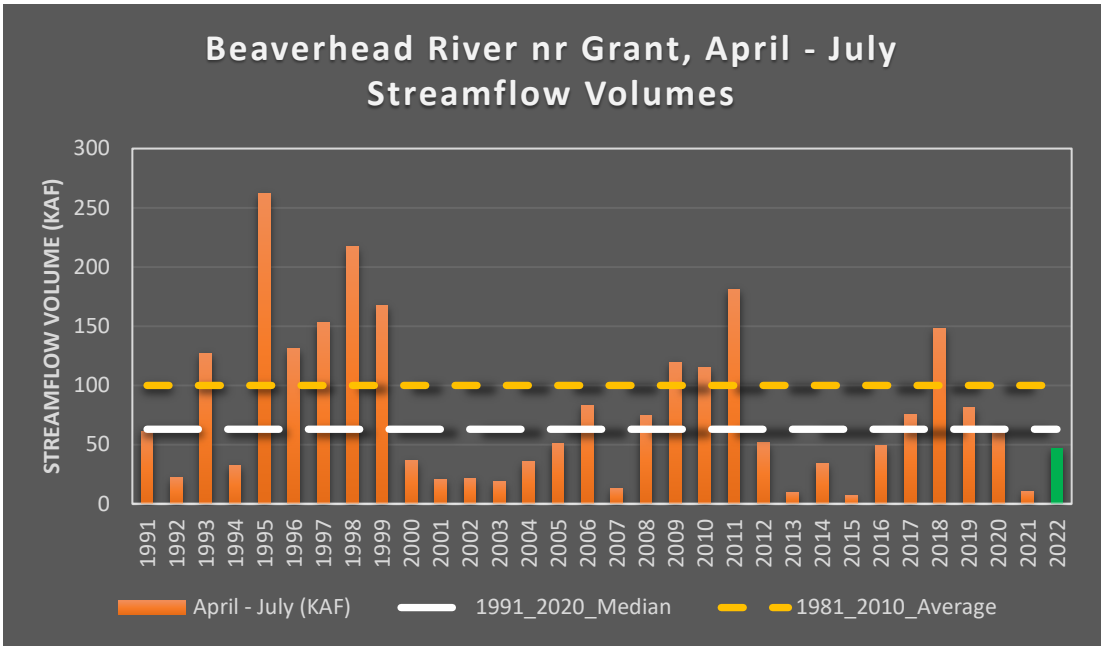
The good news for Montana is that for most of the state's forecast points there is not a significant difference between the 1991-2020 normals and the 1981-2010 normals. In fact, the new normals are within +/- 10% of the previous normals for 85% of the streamflow forecasts points in Montana. There are a few areas in the state that did see significant differences moving from averages to medians which are

highlighted by the purple circles on the map above and listed in the table below. The table shows all the streamflow forecasts points in Montana where the new normals are more than 10% different than the previous normals.

	1991-2020 Median as % of 1981-2010 Average	% Difference
Bighorn R nr St. Xavier	117%	17%
Mill Ck ab Bassoo Ck nr Niarada	116%	16%
Tongue R at State Line nr Decker	114%	14%
Powder R nr Locate	113%	13%
Dupuyer Ck nr Valier	89%	-11%
Swift Reservoir Inflow	88%	-12%
Badger Ck nr Browning	88%	-12%
Big Hole R bl Big Lake Ck at Wisdom	87%	-13%
Lima Reservoir Inflow	84%	-16%
Beaverhead R at Barretts	73%	-27%
Teton R nr Dutton	66%	-34%
Beaverhead R nr Grant	63%	-37%

There are four forecast points where the new normals are significantly greater than the previous normals; this means that streamflow forecasts that would have been considered normal compared to the previous normals will now have percentages that are below normal. There are eight forecast points where the new normals are significantly lower than the previous normals; this means that streamflow forecasts that would have been 100% of normal compared to the 1981-2010 normals will be greater than 100% of normal compared to the new calculations. The areas where this "inflation" of percentages will be the most prevalent are in the Beaverhead and Teton rivers.

Taking a closer look at the Beaverhead River near Grant, which is the forecast point that had the biggest change moving from the 1981-2010 averages to 1991-2020 medians, we can examine how this change affects the recently issued March 1 forecasts.

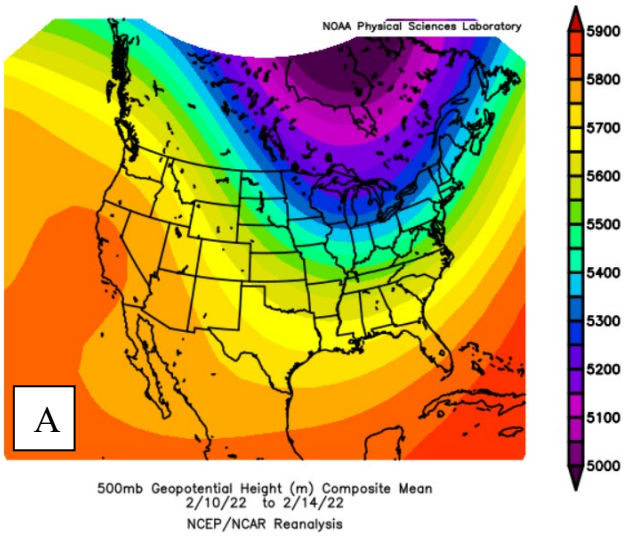


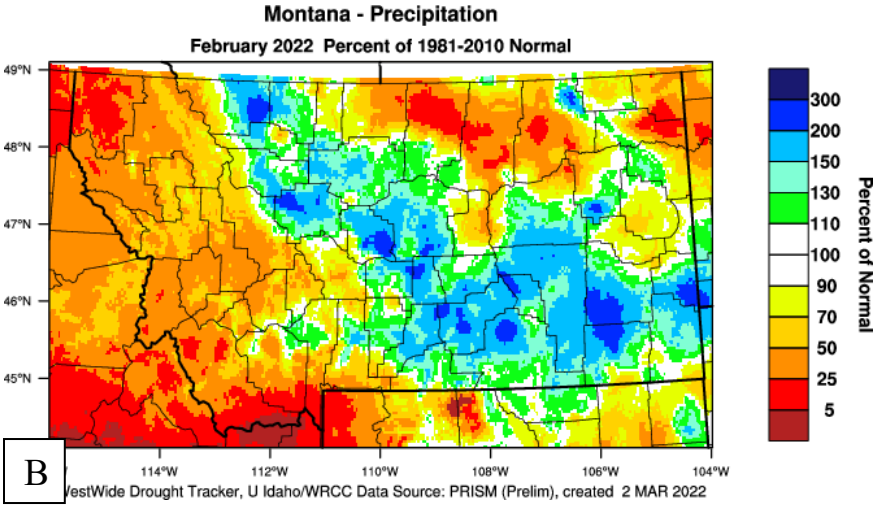
The chart to the right shows April – July streamflow volumes back to 1991 for the Beaverhead River near Grant compared to the 1991-2020 median as well as the 1981-2010 average. The green tick for 2022 is the forecast for April – July flows issued on March 1, 2022. The forecast is calling for 47 KAF for that time period, which is 75% of the new normal. If we compare the current forecast to the previous normal it would be just 47%; that's a 28% difference!

For these forecast points where the new normals have changed significantly from the previous normals it is important to recalibrate what is considered "normal" and in these cases the actual forecast values in KAF should be given greater weight than the percentages calculated.

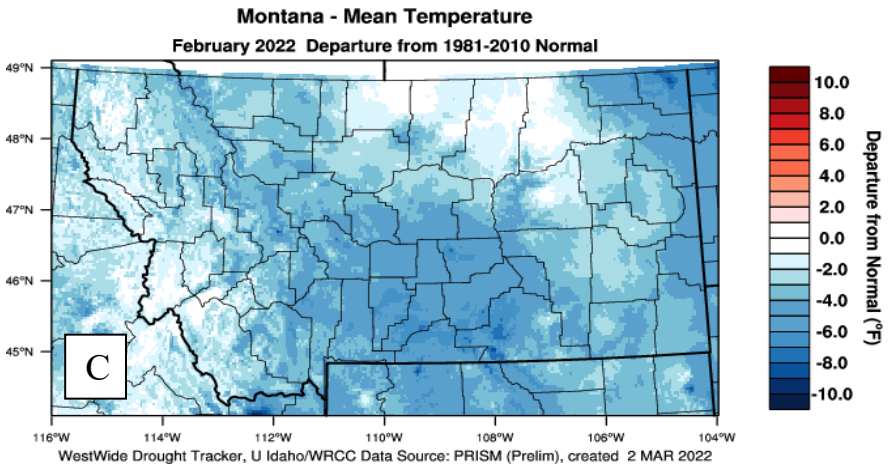
Weather and Climate

Despite another round of promising weather outlooks, February did not bring the anticipated storms and was, on the whole, disappointingly dry. The main culprit was a stubborn ridge of high pressure off the West Coast that blocked Pacific moisture from flowing to the Rocky Mountain region. The few small storms that Montana did receive resulted from limited moisture sliding over the top of the ridge, none of which delivered the large storms that are typical in February. Map A, to the right, shows a region of high pressure parked off the Pacific Coast during the February 10-14 period. Moisture originating west of the US had a difficult time reaching Montana as it was deflected to the north. This northerly deflection has meant that British Columbia is having an excellent snow year.





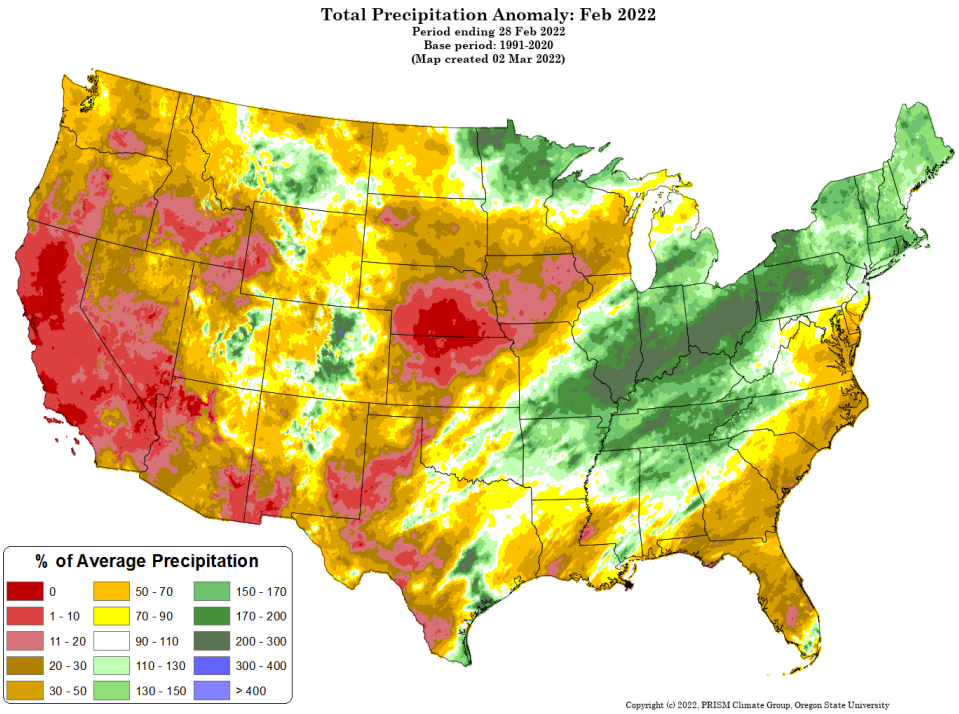
One result of the high pressure ridging and atypical circulation patterns in this region during February is that precipitation patterns favored the Rocky Mountain front as well as some of the central and eastern island ranges of Montana, some of which reported higher than normal February precipitation (Map B). Northwest and southwest Montana, by contrast, often receive significant February precipitation in the form of snow but missed out on their usual gains this year and reported considerably less precipitation during February 2022 than in a typical year.



Many days in February felt warm, but average temperatures for the month came out to slightly below normal (C). Arctic air during the fourth week of February brought temperatures significantly below normal. Many SNOTELs recorded nighttime lows at or approaching -30°F for several days, which contributed to the below-normal average for the month.

Precipitation and Snowpack Overview

Since early January, winter, or lack of, has not brought needed precipitation to most of Montana. January precipitation was below normal, and February was worse in many of Montana's river basins. Southwest Montana only received around 50-80% of its typical February precipitation. The Madison River basin received less than 50%. All SNOTEL sites near West Yellowstone, MT recorded record low monthly precipitation, except Black Bear which recorded its second lowest in 44 years. Northwest Montana along the continental divide and the eastside of the Bighorns were exceptions and received near normal precipitation for the month. The Powder and Tongue River basins received consistent precipitation throughout the month, while northern and northwest Montana received most of its monthly precipitation during the last week of the February. Stahl Peak SNOTEL (6030 ft) in the northern Whitefish Range received over 5 inches of precipitation during the last three days in February. Despite lack of recent precipitation in other parts of Montana, overall water year to date precipitation is not too far below normal.



Total Precipitation Anomaly. CONUS. February 2022. Prism Climate Group

The Milk, Smith-Judith-Musselshell, and Upper Yellowstone are the only major river basins with lower than 90% of normal water year precipitation (75-89%).

Due to the lack of February precipitation most snowpack percentages decreased from last month. The Sun-Teton-Marias, Powder, and Tongue River basins were the only exceptions and increased slightly. Like last month the snowpack west of the Continental Divide is faring better than east. Across all of Montana's major river basins, the current snowpack percent of normal ranges from 77% to 107%, with the Smith-Judith-Musselshell, Gallatin, and Upper Yellowstone at the lower end of that range and the Sun-Teton-Marias, Kootenai, and St. Marys at the upper end. Last year much of the seasonal snowpack was recovered during February and we all hoped for the same this year. The snowpack was overall in much better shape last year on March 1, except for the Sun-Teton-Marias, Lower Clark Fork, Flathead, Kootenai, and St. Marys which were similar to this year.

Basins currently lacking snowpack will need well above normal precipitation over the next couple months to meet their typical snowpack peaks. While the chances of meeting those peaks becomes less likely as the season progresses, it's not impossible to recover from a well below normal March 1 snowpack. As an example, the Upper Yellowstone currently has one of the lower snowpack percentages in Montana. Past years that had a similar March 1 snowpack and recovered by May 1 are 2002, 1993, and 1991. These 3 years had well above normal precipitation in March and April, which will also be necessary this year for a recovery. In general March and April are large contributors to water year precipitation in southwest Montana. Let's hope the next couple months to brings precipitation like March-April in 1991.

Year	March 1 SWE % of Normal (91-20)	May 1 SWE % of Normal (91-20)	March 1 to May 1 % Normal Change
1991	83%	130%	47%
1993	87%	110%	23%
2002	83%	97%	14%
2022	79%	-	-

Upper Yellowstone River Basin Snow Water Equivalent Percent of Normal compared to similar years.

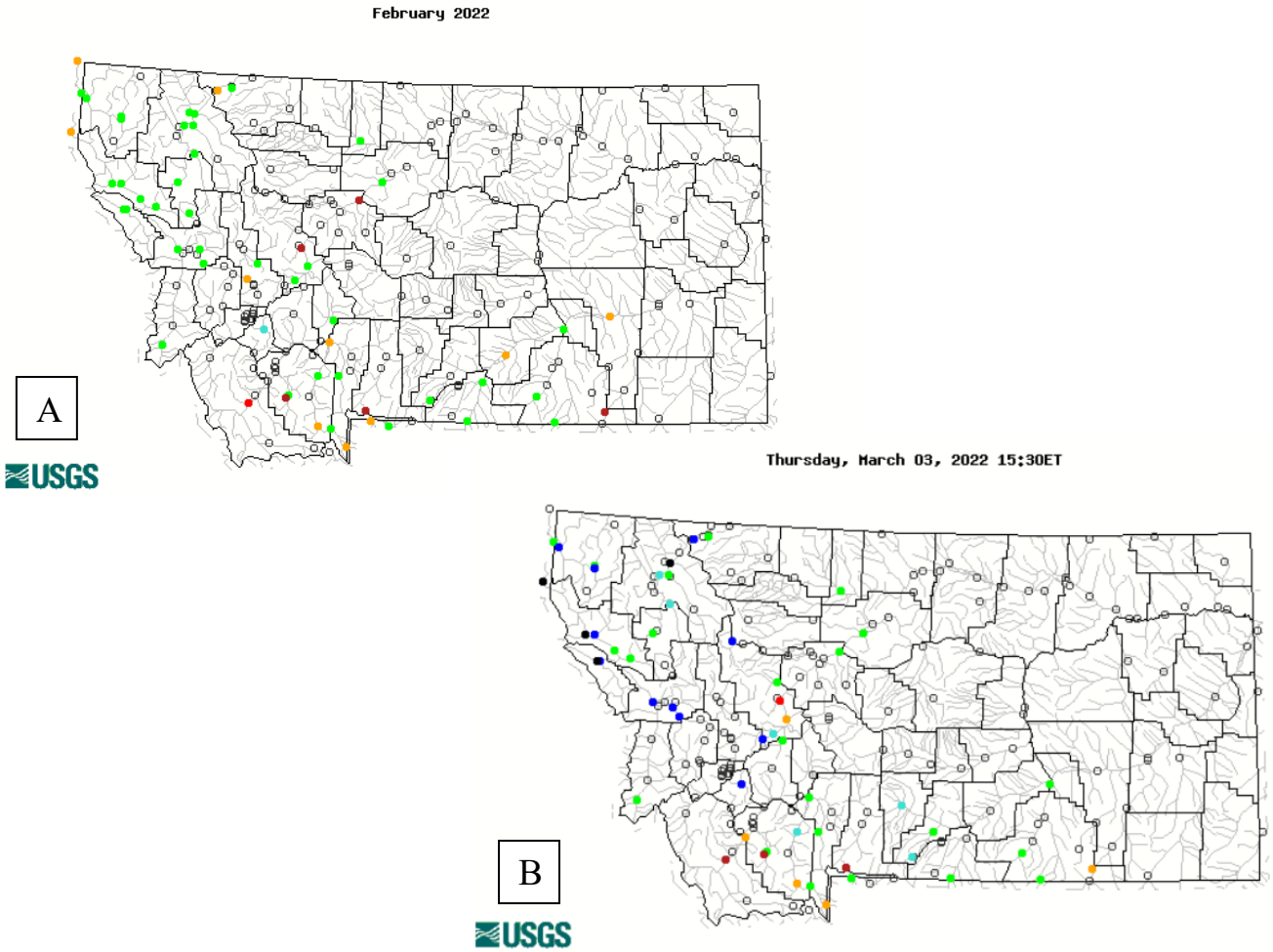
River Basin Name	February 1 SWE % Normal	March 1 SWE % Normal	SWE % Change
Bear Paw	94%	79%	-15%
Beaverhead	92%	82%	-10%
Big Hole	94%	87%	-7%
Big Horn	85%	85%	+0%
Bitterroot	97%	95%	-2%
Blackfoot	90%	87%	-3%
Boulder (Jefferson)	82%	89%	+7%
Boulder (Yellowstone)	89%	86%	-3%
Clarks Fork Yellowstone	89%	84%	-5%
Fisher	97%	99%	+2%
Flathead Lake	92%	92%	+0%
Flint	104%	90%	-14%
Gallatin ab Gateway	95%	84%	-11%
Greybull-Wood	82%	85%	+3%
Helena Valley	89%	85%	-4%
Judith	87%	79%	-8%
Kootenai in Canada	124%	114%	-10%
Kootenai in Montana	103%	101%	-2%
Little Bitterroot	82%	80%	-2%
Lower Clark Fork	105%	100%	-5%
Madison ab Hebgen	94%	79%	-15%
Madison bw Hebgen	93%	81%	-12%
Marias	93%	99%	+6%
Middle Fork Flathead	96%	103%	+7%
Musselshell	89%	77%	-12%
North Fork Flathead	105%	99%	-6%
Northern Gallatin	77%	74%	-3%
Owl	116%	107%	-9%
Powder	79%	83%	+4%
Rock (Clark Fork)	98%	91%	-7%
Rock (Yellowstone)	74%	74%	+0%
Ruby	80%	72%	-8%
Shields	54%	62%	+8%
Shoshone	90%	83%	-7%
Smith	85%	81%	-4%
South Fork Flathead	91%	89%	-2%
Southern Flathead	101%	99%	-2%
St. Marys	105%	105%	+0%
Stillwater (Flathead)	96%	90%	-6%
Stillwater (Yellowstone)	90%	86%	-4%
Sun	103%	103%	+0%
Swan	95%	91%	-4%
Teton	106%	105%	-1%
Tongue	90%	93%	+3%
Upper Clark	88%	86%	-2%
Wind	106%	92%	-14%
Yaak	101%	95%	-6%
Yellowstone ab Livingston	90%	82%	-8%

Reservoirs Overview

March 1 reservoir storage levels range from well below normal to above normal. Gibson, Lima, Fresno, and Nelson reservoirs are at the lower end of that range (50-70%). Mystic, Como, Hungry Horse, Painted Rocks, Helena Valley, and Cooney are all above normal (110-155%). Lake Sherburne is well above normal at 170%. In general, reservoir levels are lower than both last month and last year.

Current Streamflows

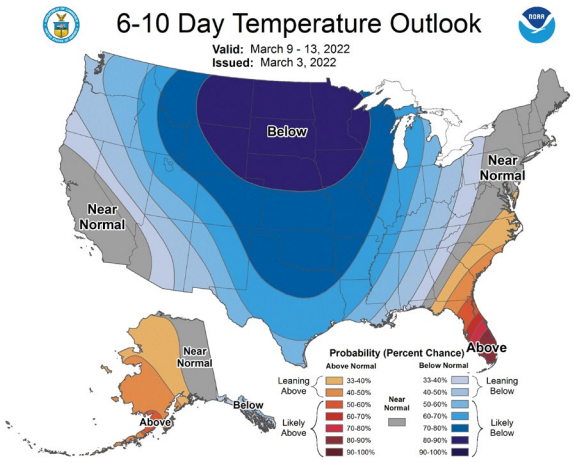
Streamflows in February were mostly similar to normal (map A). However, the dramatic warming trend at the end of the month caused some melting of the snowpack at lower and middle elevations, which in turn raised streamflow levels. This is visible in map B as the darker blue dots, or much above normal streamflow. Early melting is never a promising sign, but the higher elevation snowpack is holding on and streamflow forecasts for the summer still look reasonable.

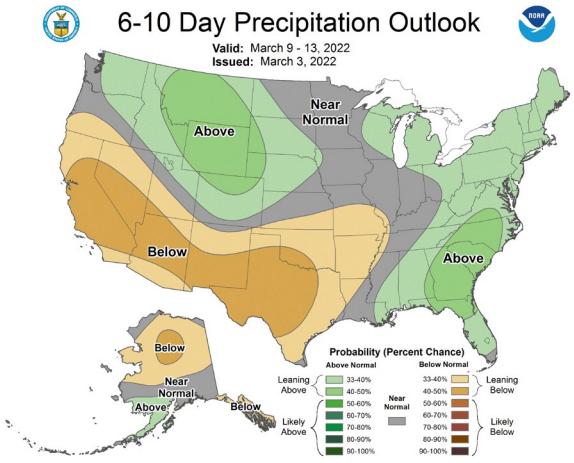


Weather and Climate Predictions

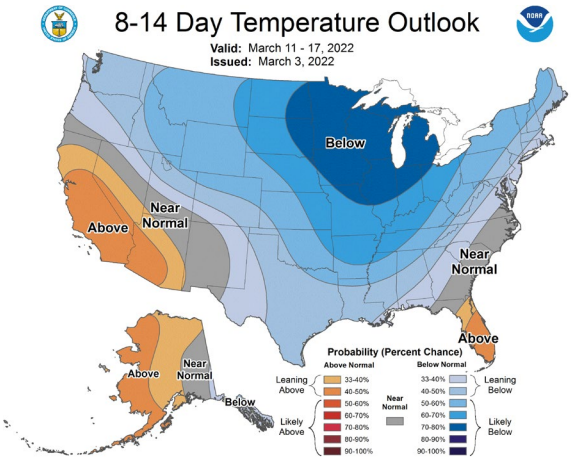
NOAA's Climate Prediction Center is still calling for La Niña circulation to continue through spring before transitioning to ENSO-neutral circulation for the summer months. So far, these conditions have not been particularly favorable to Montana this year, but there is still a little bit of time left for weather to help bolster lagging snowpack conditions. The next few weeks in particular have the potential to improve the water supply outlook for summer, and the 6-10 day outlook below shows promise with good chances for below average temperatures and above average precipitation across Montana.

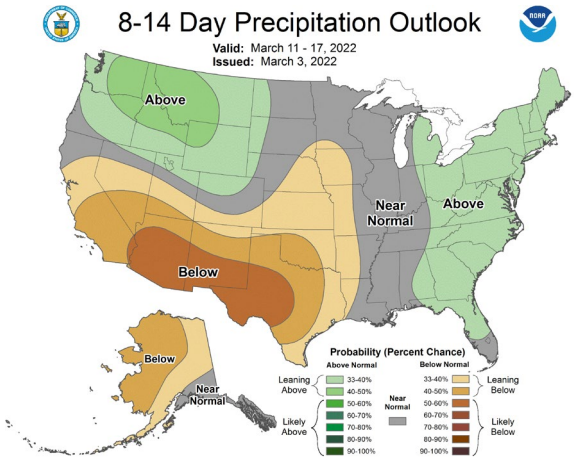
6-10 Day Outlook (as of March 3, 2022)





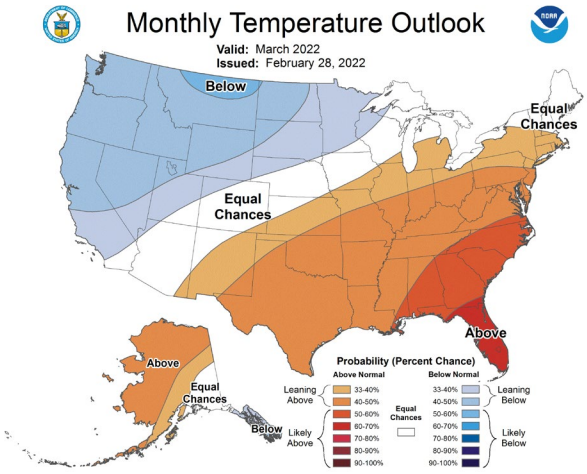
8-14 Day Outlook (as of March 3, 2022)

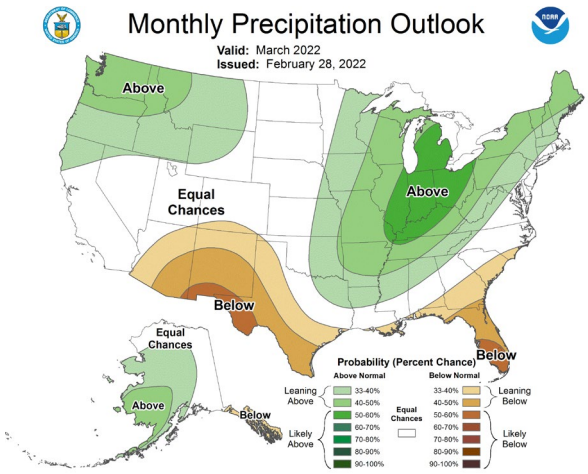




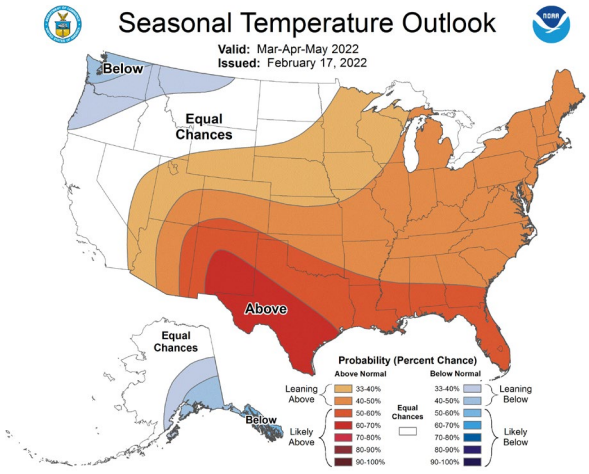
Long term outlooks for spring are less definitive, but the one month outlook at least slightly favors below normal temperatures and above normal precipitation, which would be beneficial in building or holding onto snowpack. The three month outlooks shows equal chances of high/low temperatures and precipitation for the majority of Montana, so how it plays out through spring is anyone's guess. Springtime weather will be a major factor in streamflow: if it warms up quickly, streams could peak early and have less water to deliver through the summer. Conversely, if it stays cool – and if more snow arrives next week as it is predicted to – the water supply picture could be better.

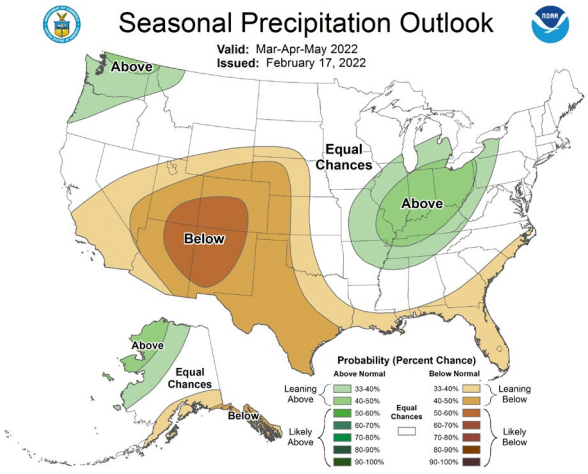
One Month Outlook





Three Month Outlook





Official Streamflow Forecasts

How Forecasts Are Made

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts.

Snowpack measurements are obtained by using a combination of manual and automated SNOTEL measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. At automated stations, snow depth and snow water equivalent as well as precipitation and temperature are monitored on a daily basis. Both monthly and daily data are used to project snowmelt runoff.

Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed the most probable forecast 50% of the time. Similarly, the actual streamflow volume can be expected to exceed the 90% forecast volume 90% of the time. The same is true for the 70%, 30%, and 10% forecasts. Generally, the 90% and 70% forecasts reflect drier than normal hydrologic and climatic conditions in the coming months; the 30% and 10% forecasts reflect wetter than normal conditions. As the forecast season progresses, a greater portion of the future hydrologic and climatic uncertainty will become known and the additional forecasts will move closer to the most probable forecasts.

Summary

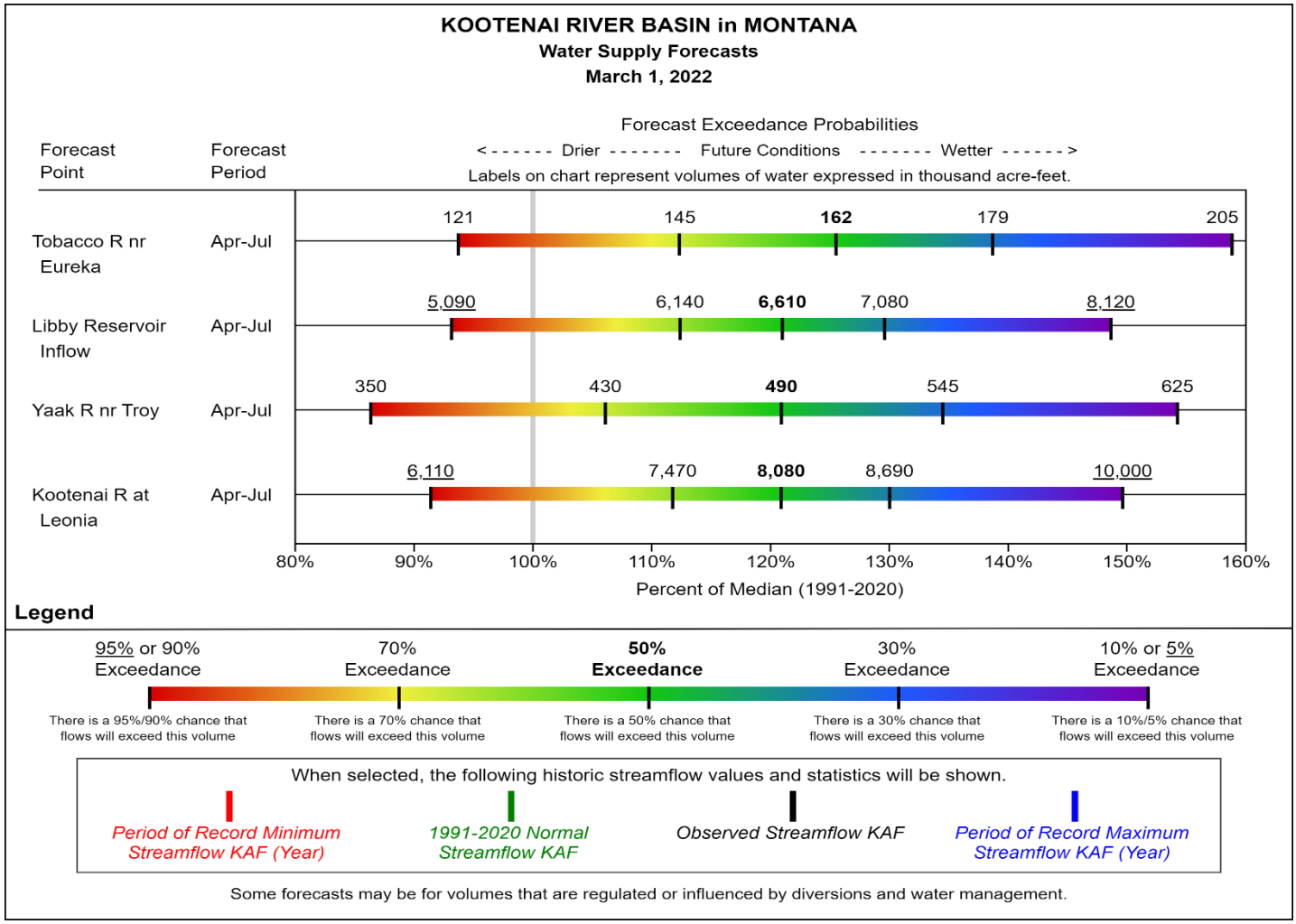
This is the first month that official streamflow forecasts are issued for rivers in Montana by the NRCS. The March 1 forecasts generally follow the snowpack pattern across the state, indicating below normal streamflows for April – July in southwest Montana, the Yellowstone, and the mainstem of the Missouri, and near to above normal streamflows west of the Continental Divide and in the streams along the Rocky Mountain Front.

There are a few forecasts that call for well below normal flows for the April – July time period that should be highlighted. West of the Continental Divide the forecast for Nevada Creek near Helmville stands out at just 74% of normal. The Nevada Mountains that feed the creek are a bit of a dry spot with the snowpack at monitoring sites ranging from 64-80% of normal as of March 1. The other forecasts that are well below normal are for the Smith River (64%) and the Musselshell at Harlowton and near Roundup (68% and 48% respectively). The snowpack measured in the Little Belts, Castle and Snowy Mountains is below normal, particularly at the lower elevations.

The month of March will determine if basins with below normal snowpacks can add to their mountain reservoirs, reach normal peaks, and improve the outlook for streamflow this spring and summer.

Please see the individual river basin charts below for individual forecast point ranges.

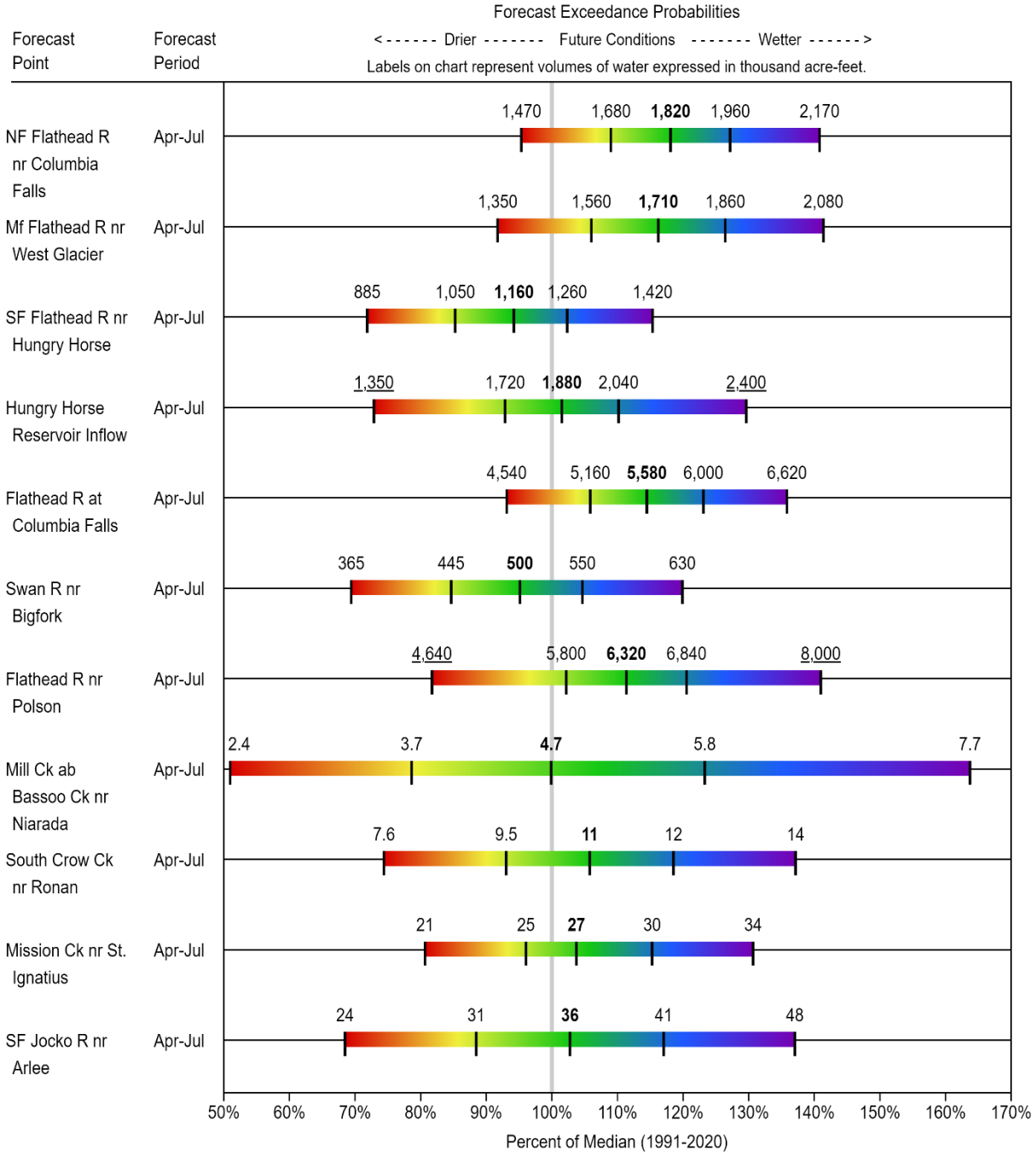
Forecast Charts



FLATHEAD RIVER BASIN

Water Supply Forecasts

March 1, 2022



Legend

95% or 90% Exceedance — There is a 95%/90% chance that flows will exceed this volume

70% Exceedance — There is a 70% chance that flows will exceed this volume

50% Exceedance — There is a 50% chance that flows will exceed this volume

30% Exceedance — There is a 30% chance that flows will exceed this volume

10% or 5% Exceedance — There is a 10%/5% chance that flows will exceed this volume

When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

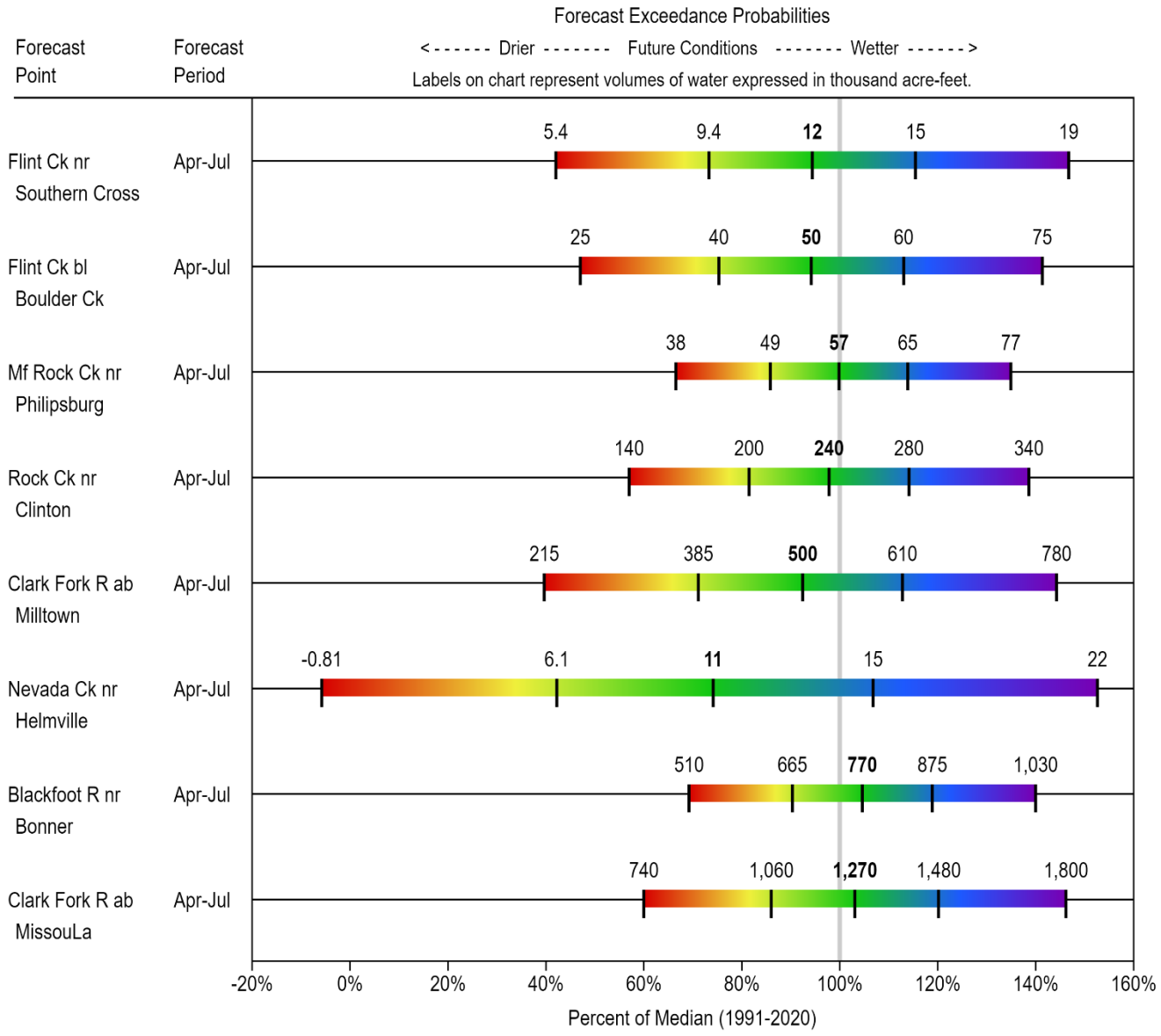
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

UPPER CLARK FORK RIVER BASIN

Water Supply Forecasts

March 1, 2022



Legend

95% or 90% Exceedance	70% Exceedance	**50% Exceedance**	30% Exceedance	10% or 5% Exceedance
There is a 95%/90% chance that flows will exceed this volume	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will exceed this volume	There is a 10%/5% chance that flows will exceed this volume

When selected, the following historic streamflow values and statistics will be shown.

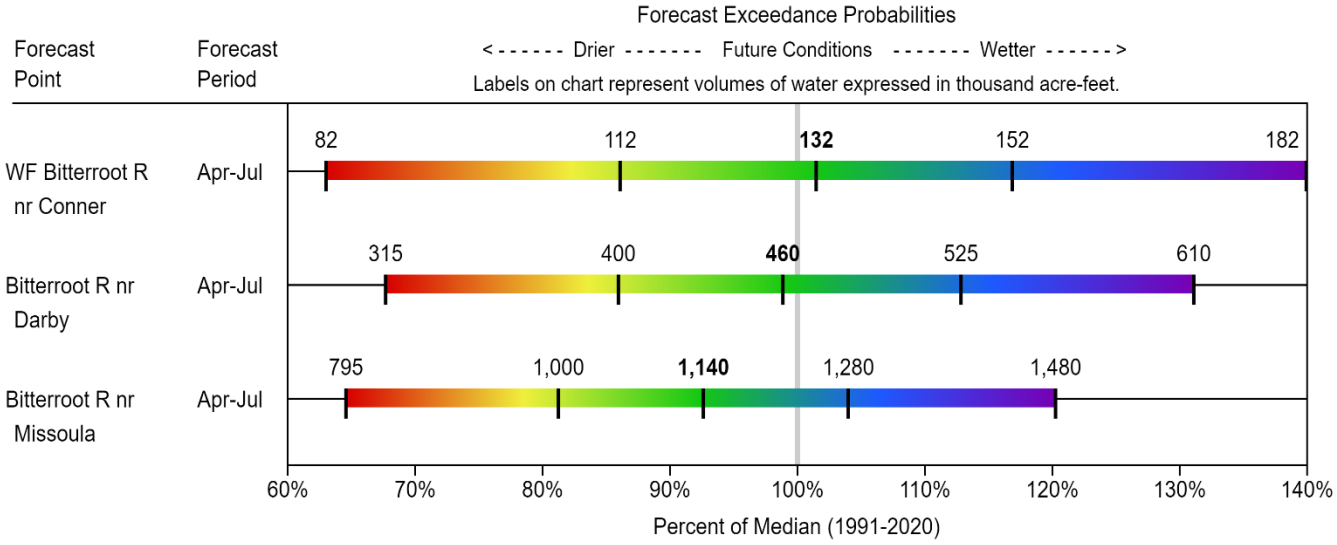
Period of Record Minimum Streamflow KAF (Year)	*1991-2020 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

BITTERROOT RIVER BASIN

Water Supply Forecasts

March 1, 2022



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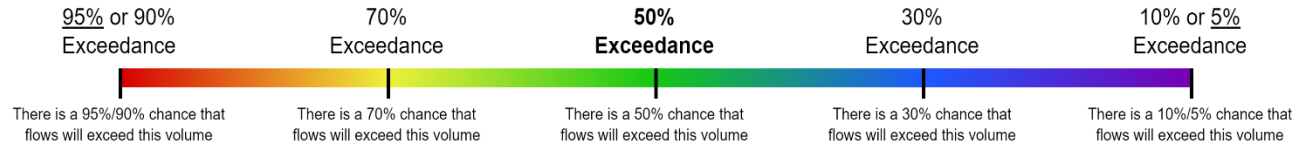


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

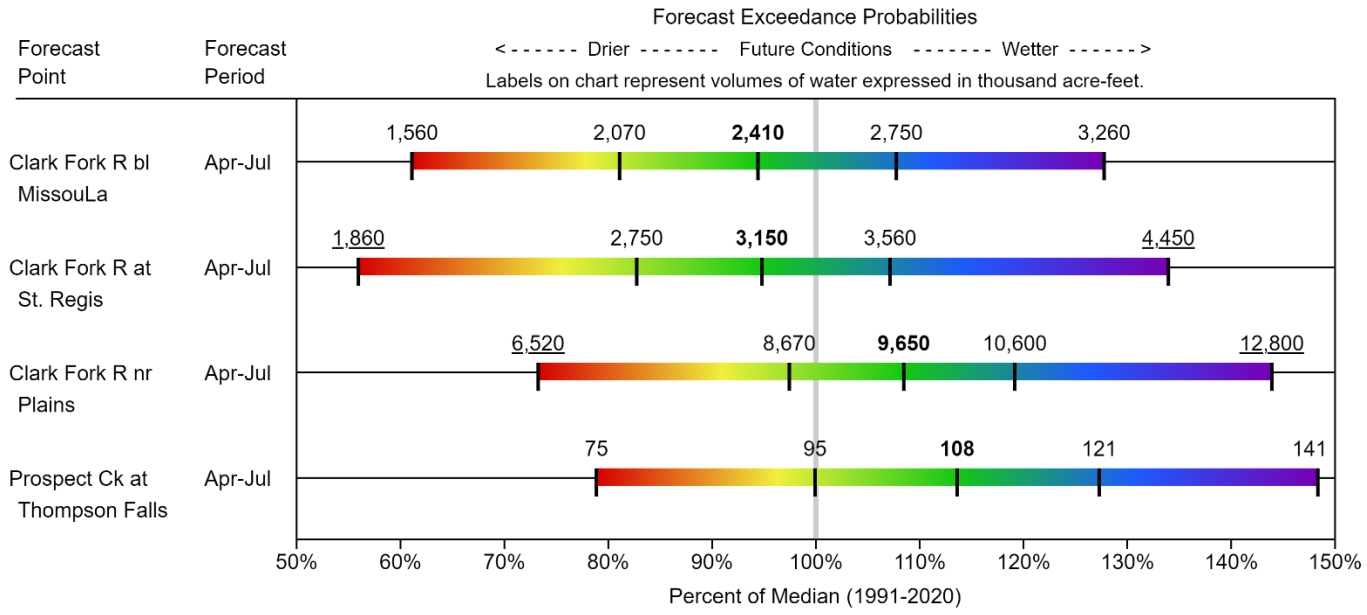
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

LOWER CLARK FORK RIVER BASIN

Water Supply Forecasts

March 1, 2022



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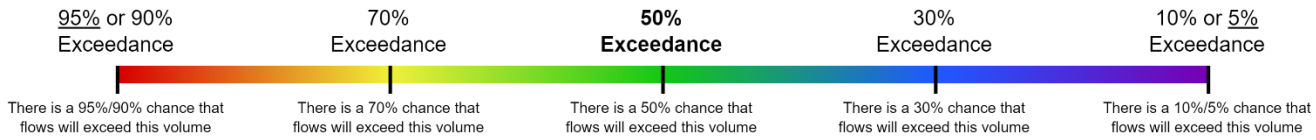


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

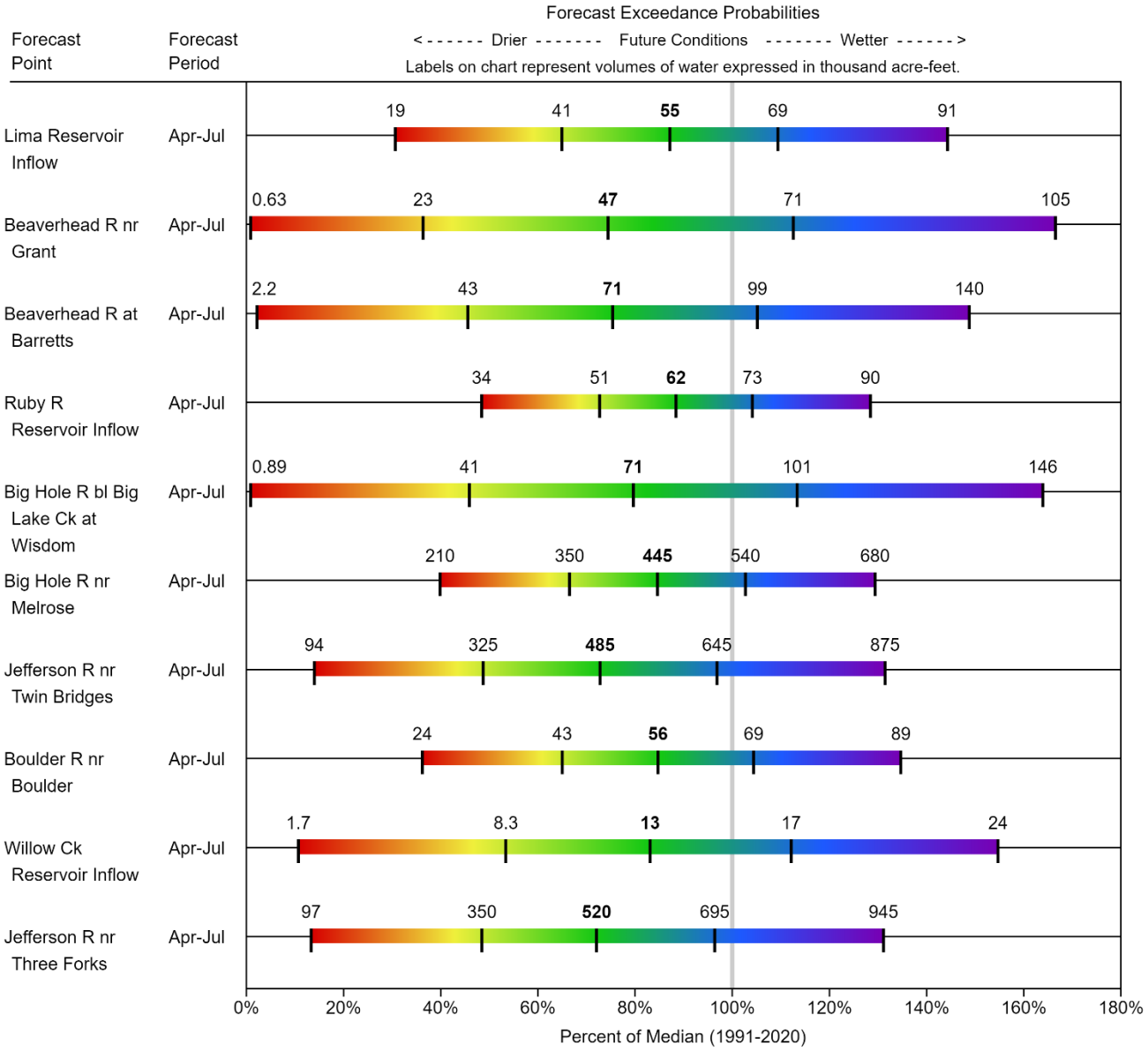
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

JEFFERSON RIVER BASIN

Water Supply Forecasts

March 1, 2022



Legend

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When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

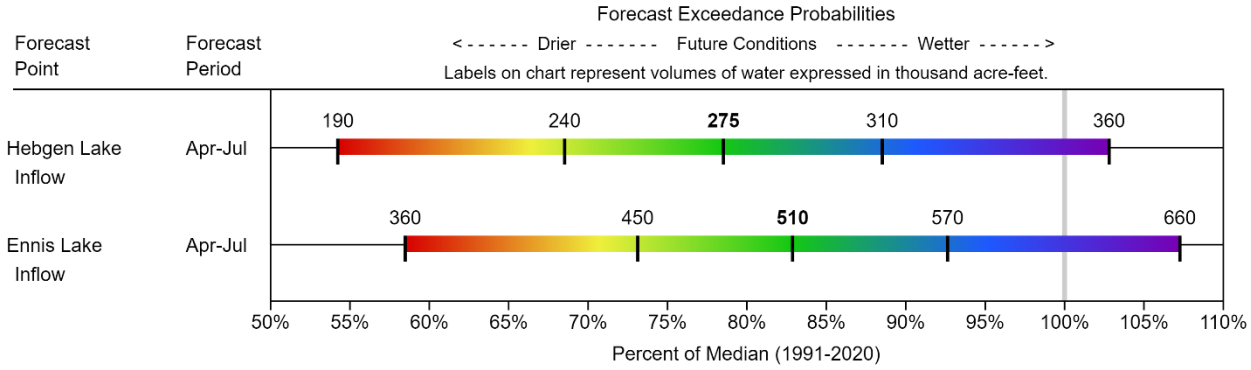
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

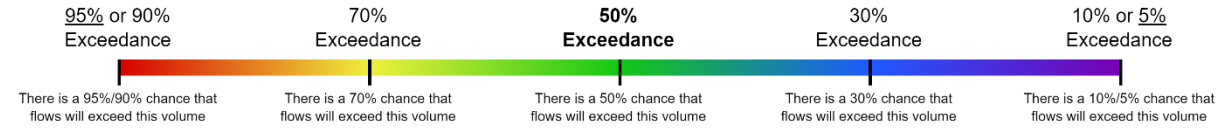
MADISON RIVER BASIN

Water Supply Forecasts

March 1, 2022



Legend



When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

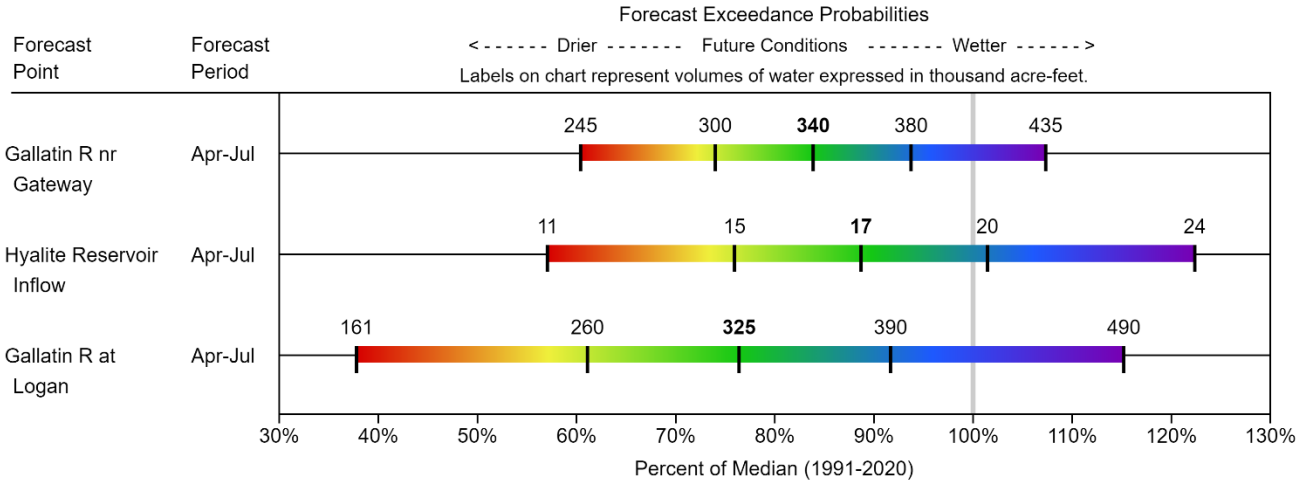
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

GALLATIN RIVER BASIN

Water Supply Forecasts

March 1, 2022



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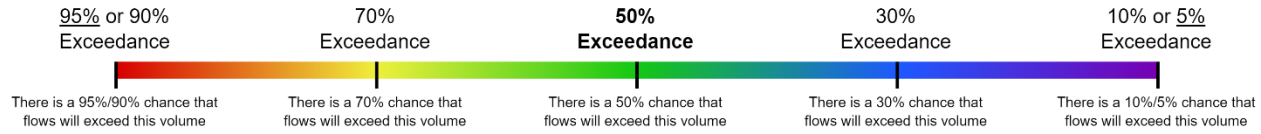


When selected, the following historic streamflow values and statistics will be shown.

Period of Record Minimum Streamflow KAF (Year)

1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

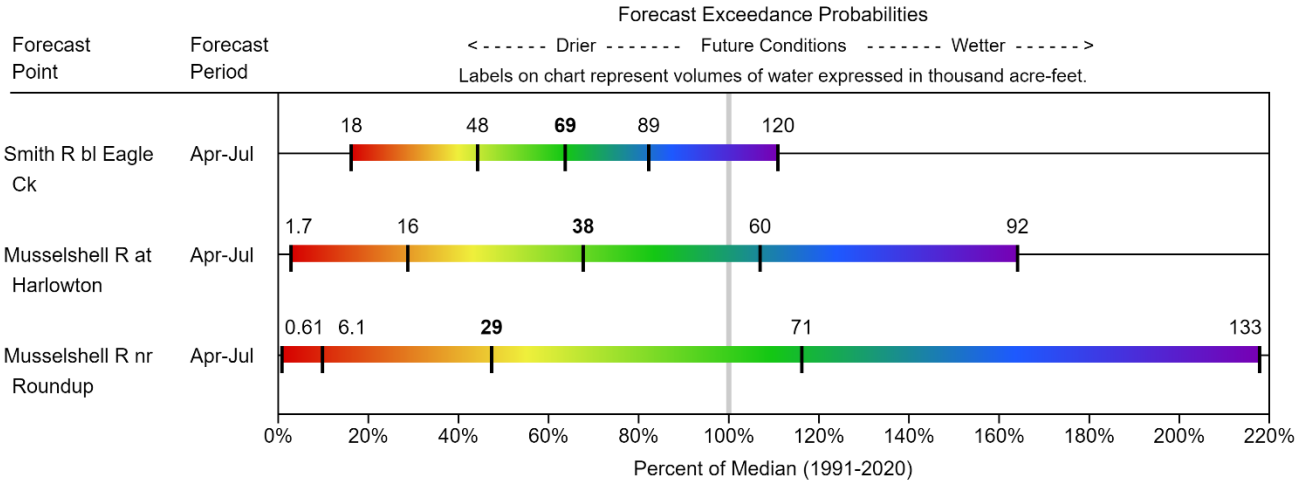
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

SMITH-JUDITH-MUSSELSHELL

Water Supply Forecasts

March 1, 2022



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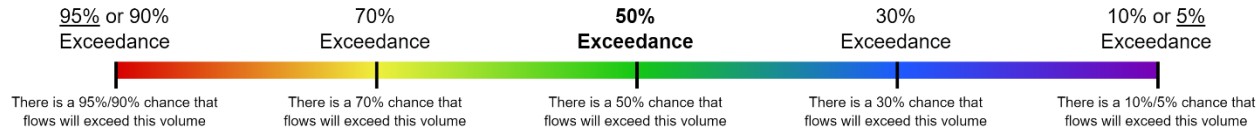

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1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

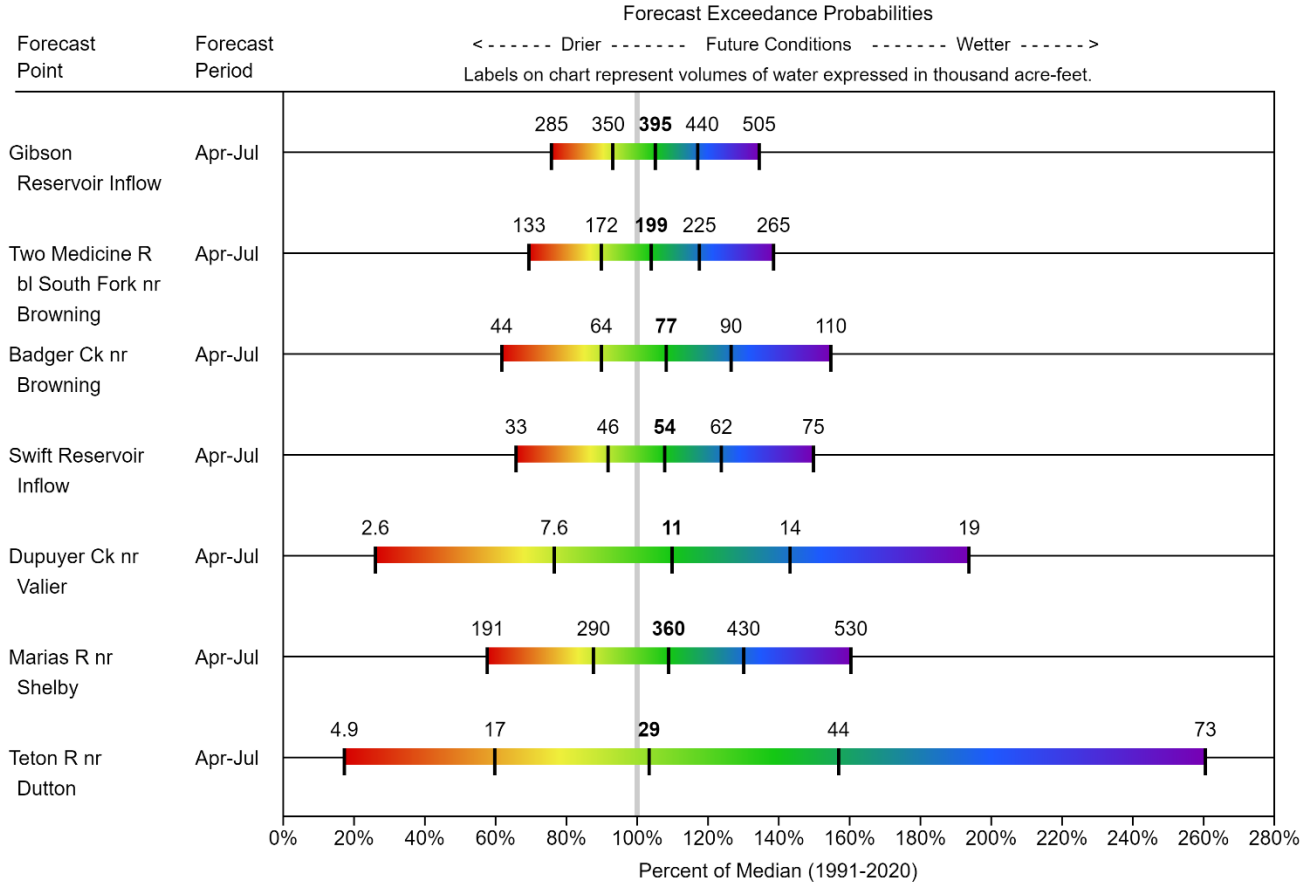
Period of Record Maximum Streamflow KAF (Year)

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

SUN-TETON-MARIAS

Water Supply Forecasts

March 1, 2022



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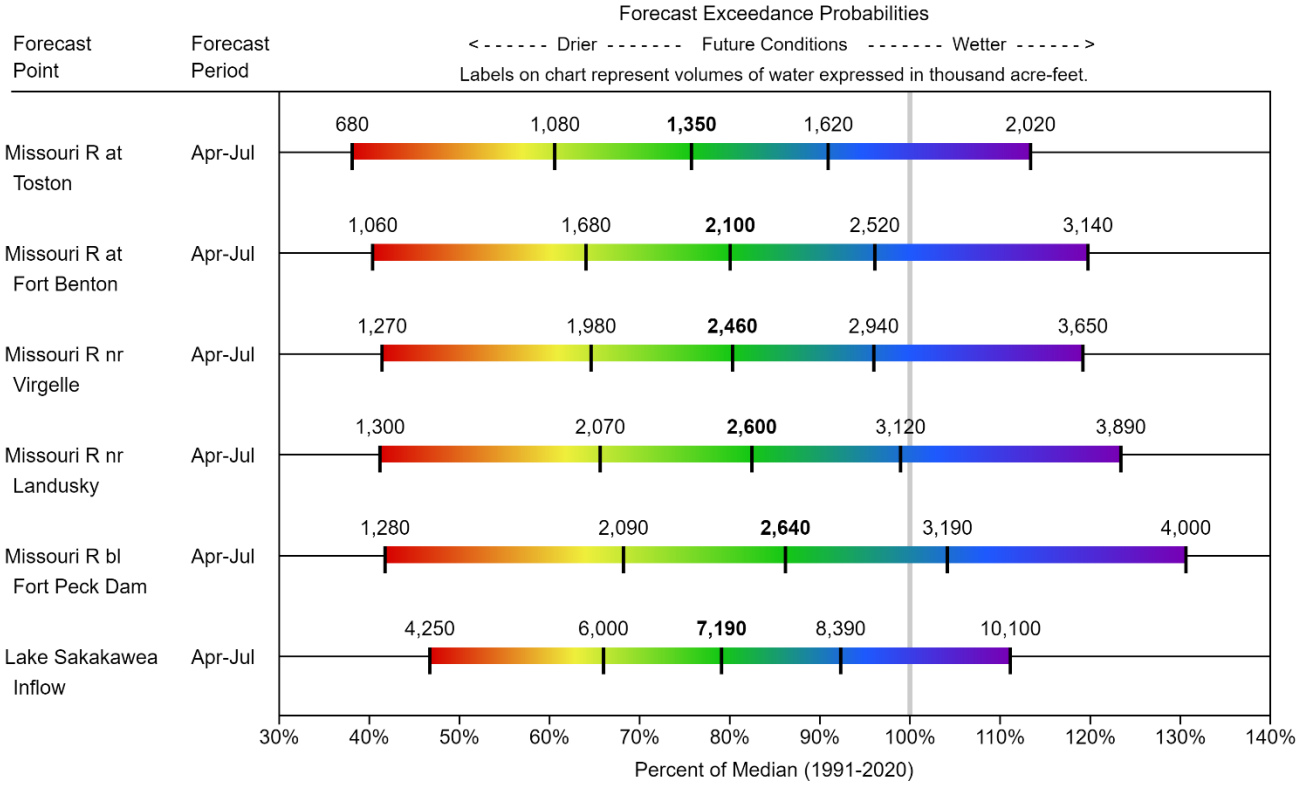
Period of Record Minimum Streamflow KAF (Year)	*1991-2020 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

MISSOURI MAINSTEM BASIN

Water Supply Forecasts

March 1, 2022



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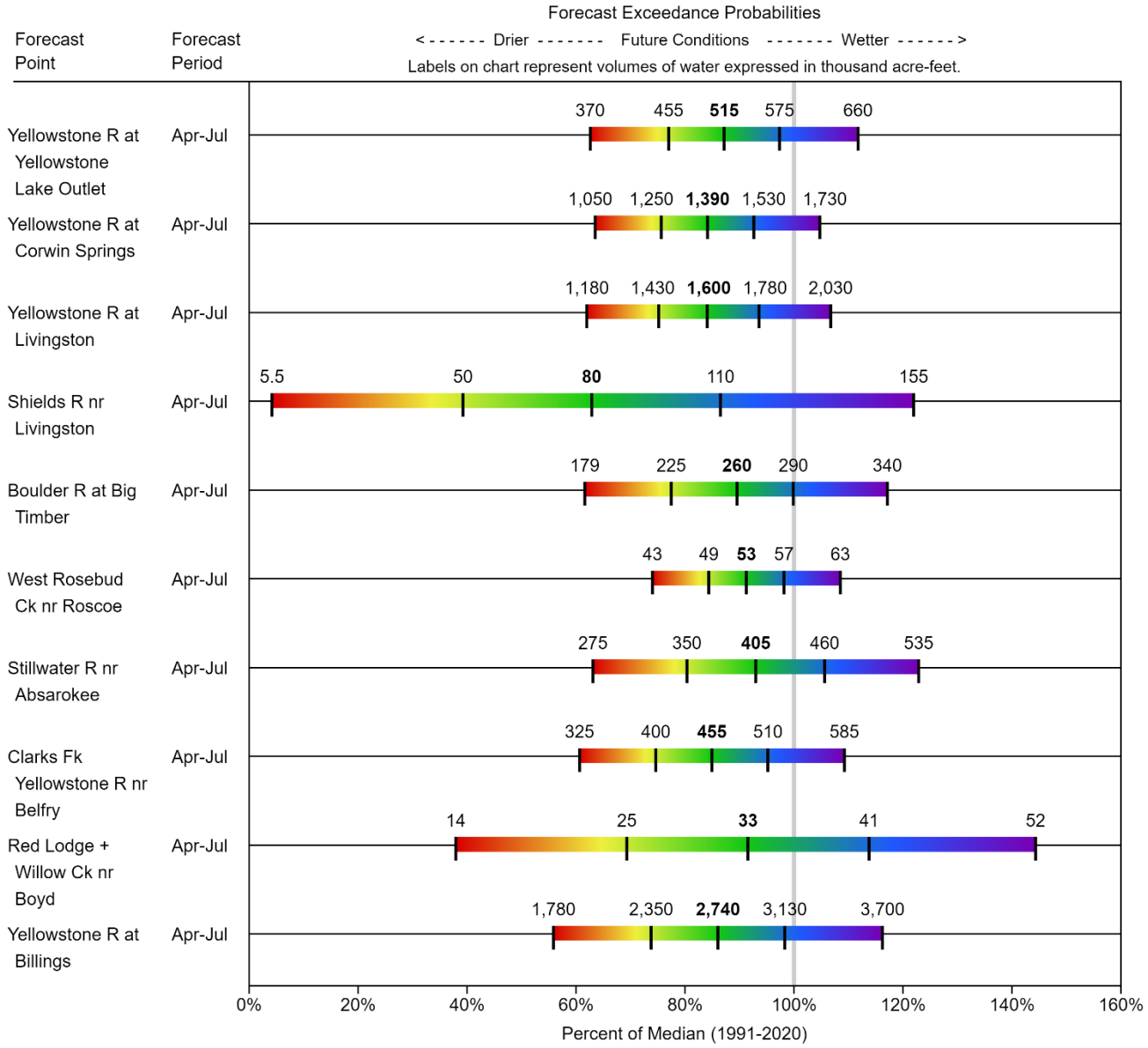
Period of Record Minimum Streamflow KAF (Year)	*1991-2020 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

UPPER YELLOWSTONE RIVER BASIN

Water Supply Forecasts

March 1, 2022



Legend

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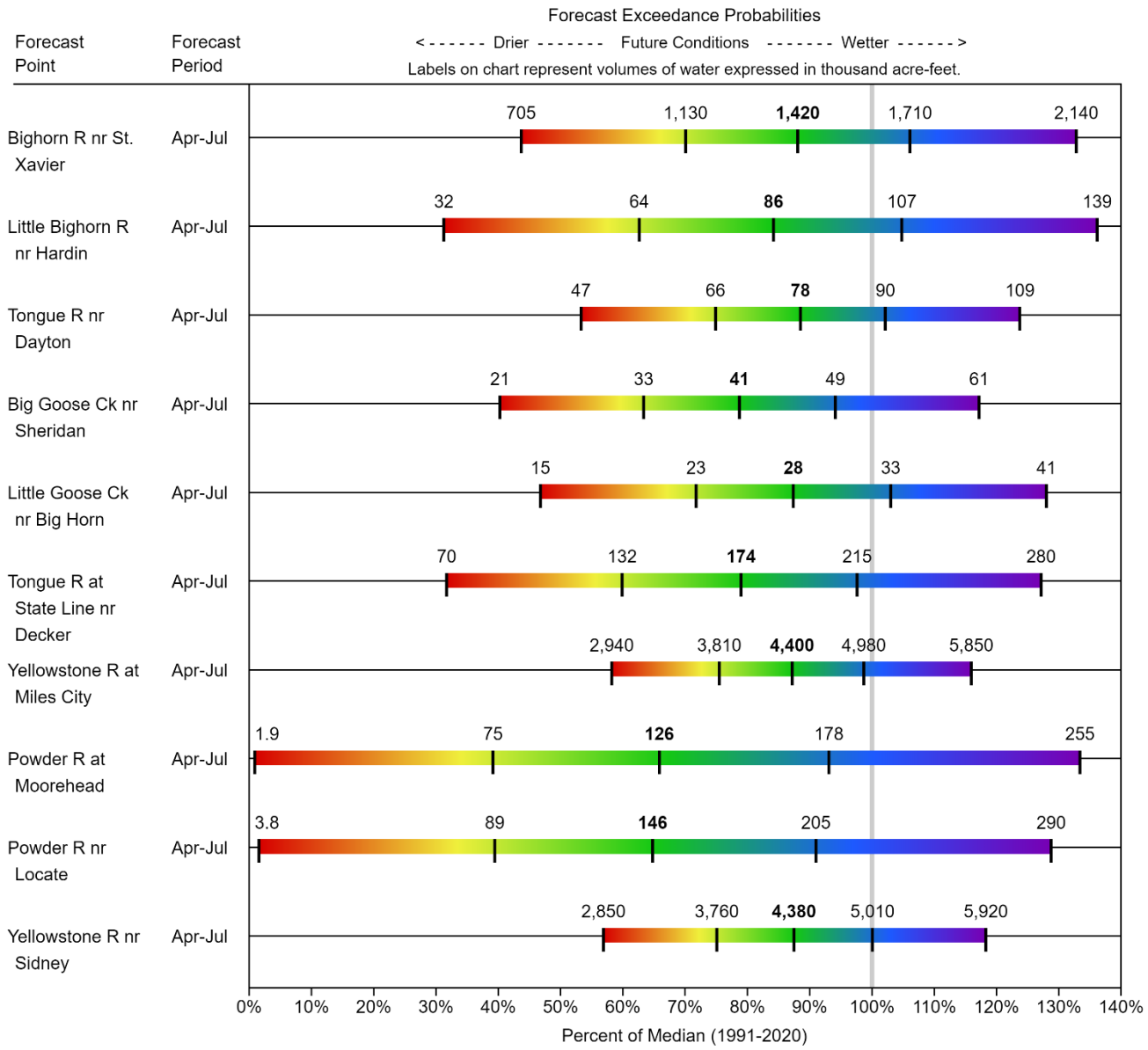
Period of Record Minimum Streamflow KAF (Year)	*1991-2020 Normal Streamflow KAF*	*Observed Streamflow KAF*	*Period of Record Maximum Streamflow KAF (Year)*

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

LOWER YELLOWSTONE RIVER BASIN (Wyoming)

Water Supply Forecasts

March 1, 2022



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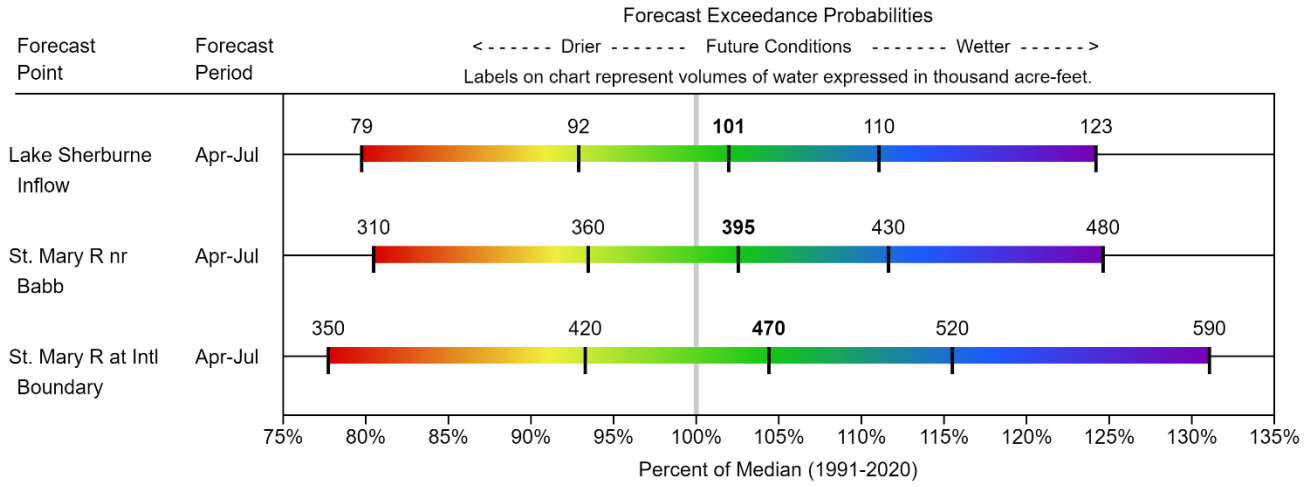
Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

ST. MARY & MILK BASINS

Water Supply Forecasts

March 1, 2022



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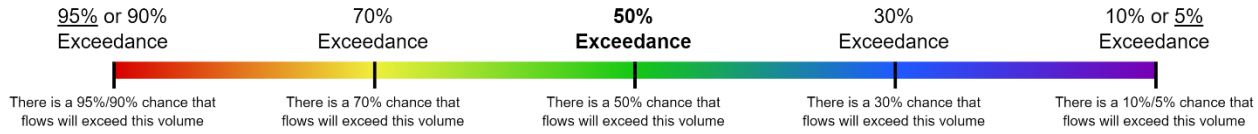

When selected, the following historic streamflow values and statistics will be shown.

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1991-2020 Normal Streamflow KAF

Observed Streamflow KAF

Period of Record Maximum Streamflow KAF (Year)

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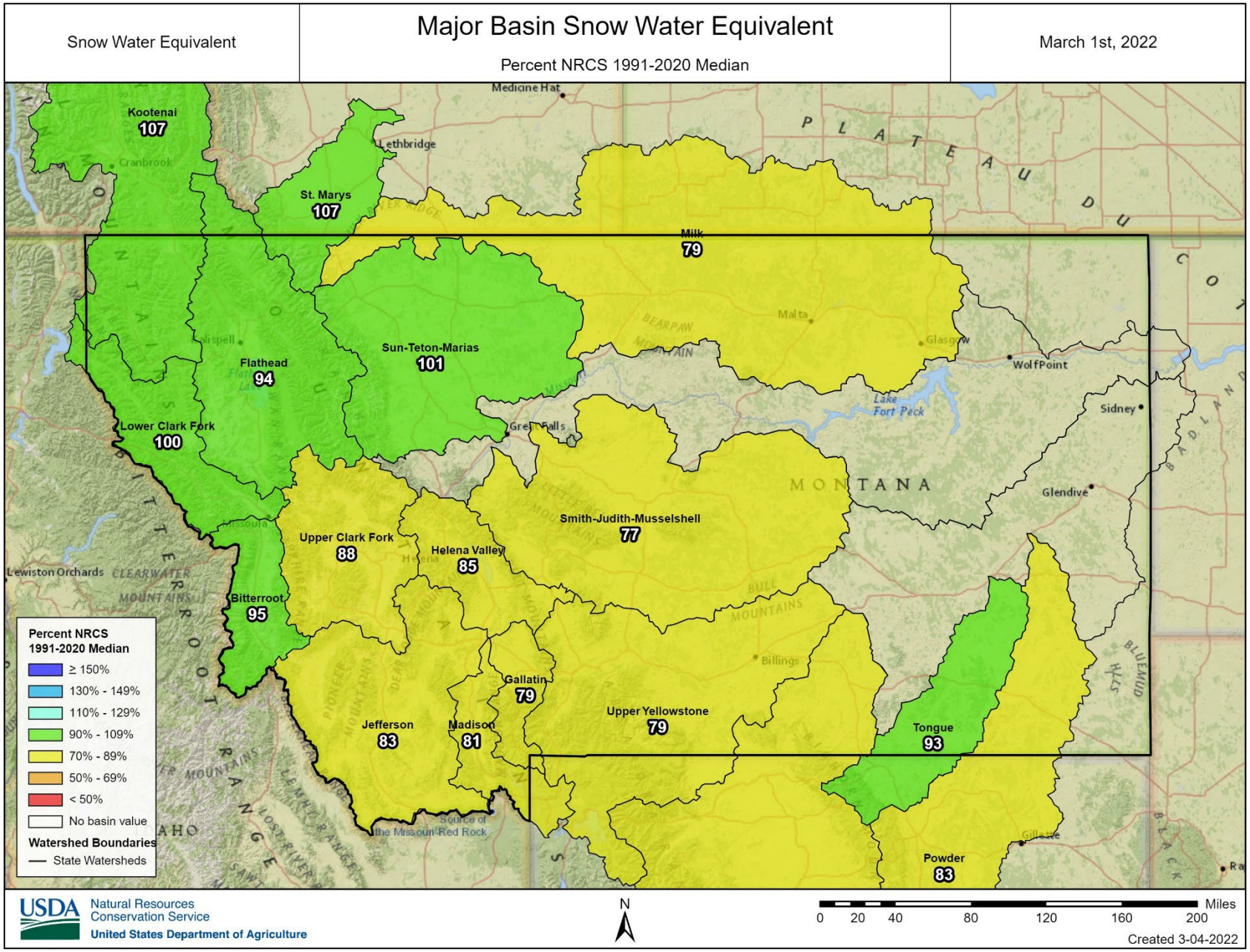
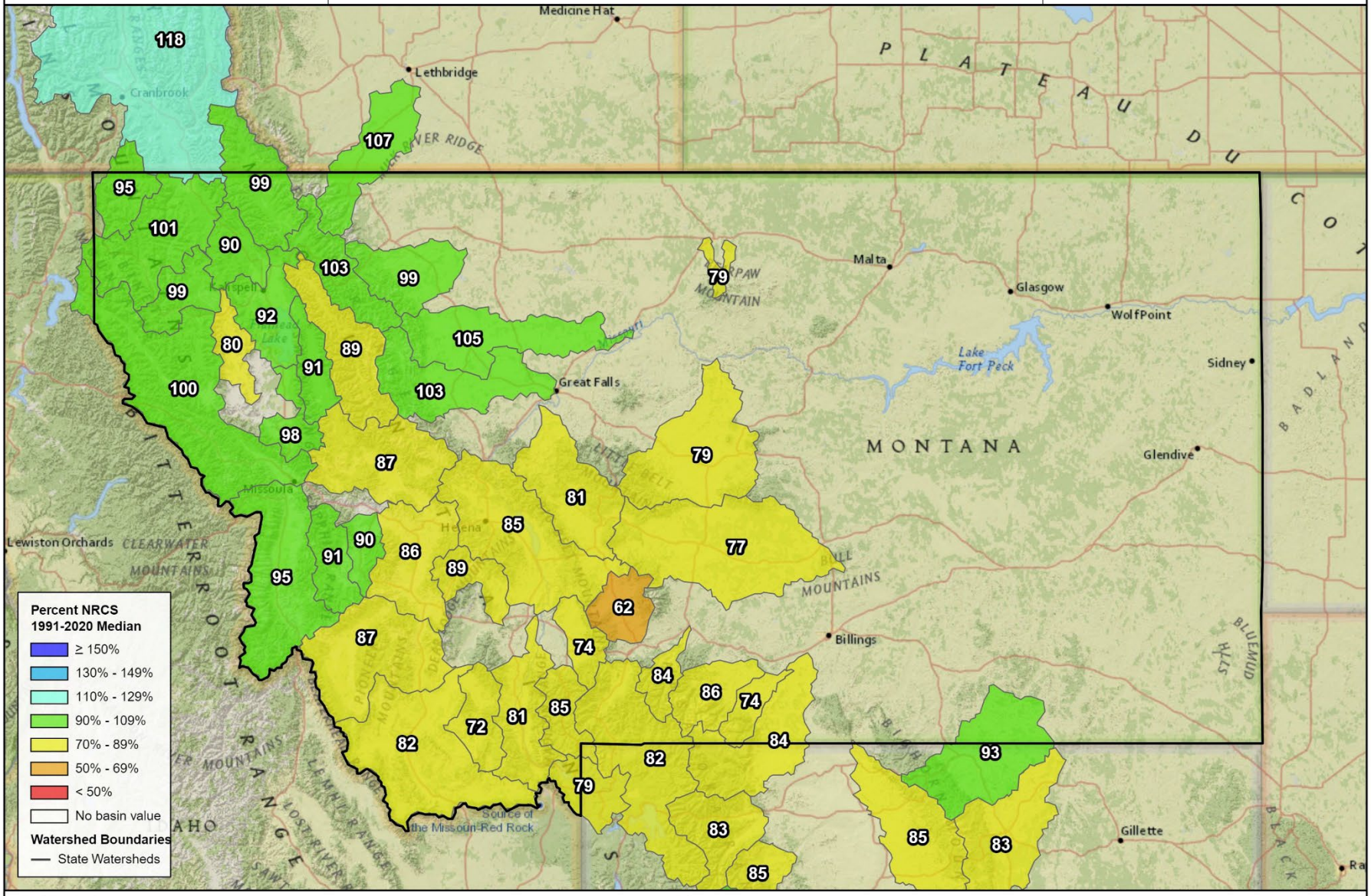
Maps


Snow Water Equivalent
Major Basin Snow Water Equivalent
Percent NRCS 1991-2020 Median
March 1st, 2022
Kootenai 107
St. Marys 107
Milk 79
Flathead 94
Sun-Teton-Marias 101
Lower Clark Fork 100
Upper Clark Fork 88
Helena Valley 85
Smith-Judith-Musselshell 77
Bitterroot 95
Gallatin 79
Jefferson 83
Madison 81
Upper Yellowstone 79
Tongue 93
Powder 83
Percent NRCS 1991-2020 Median
≥ 150%
130% - 149%
110% - 129%
90% - 109%
70% - 89%
50% - 69%
< 50%
No basin value
Watershed Boundaries
State Watersheds
USDA Natural Resources Conservation Service
United States Department of Agriculture
N
0 20 40 80 120 160 200 Miles
Created 3-04-2022

Snow Water Equivalent	Sub-Basin Snow Water Equivalent Percent NRCS 1991-2020 Median	March 1st, 2022



Percent NRCS 1991-2020 Median

- ≥ 150%
- 130% - 149%
- 110% - 129%
- 90% - 109%
- 70% - 89%
- 50% - 69%
- < 50%
- No basin value

Watershed Boundaries

- State Watersheds

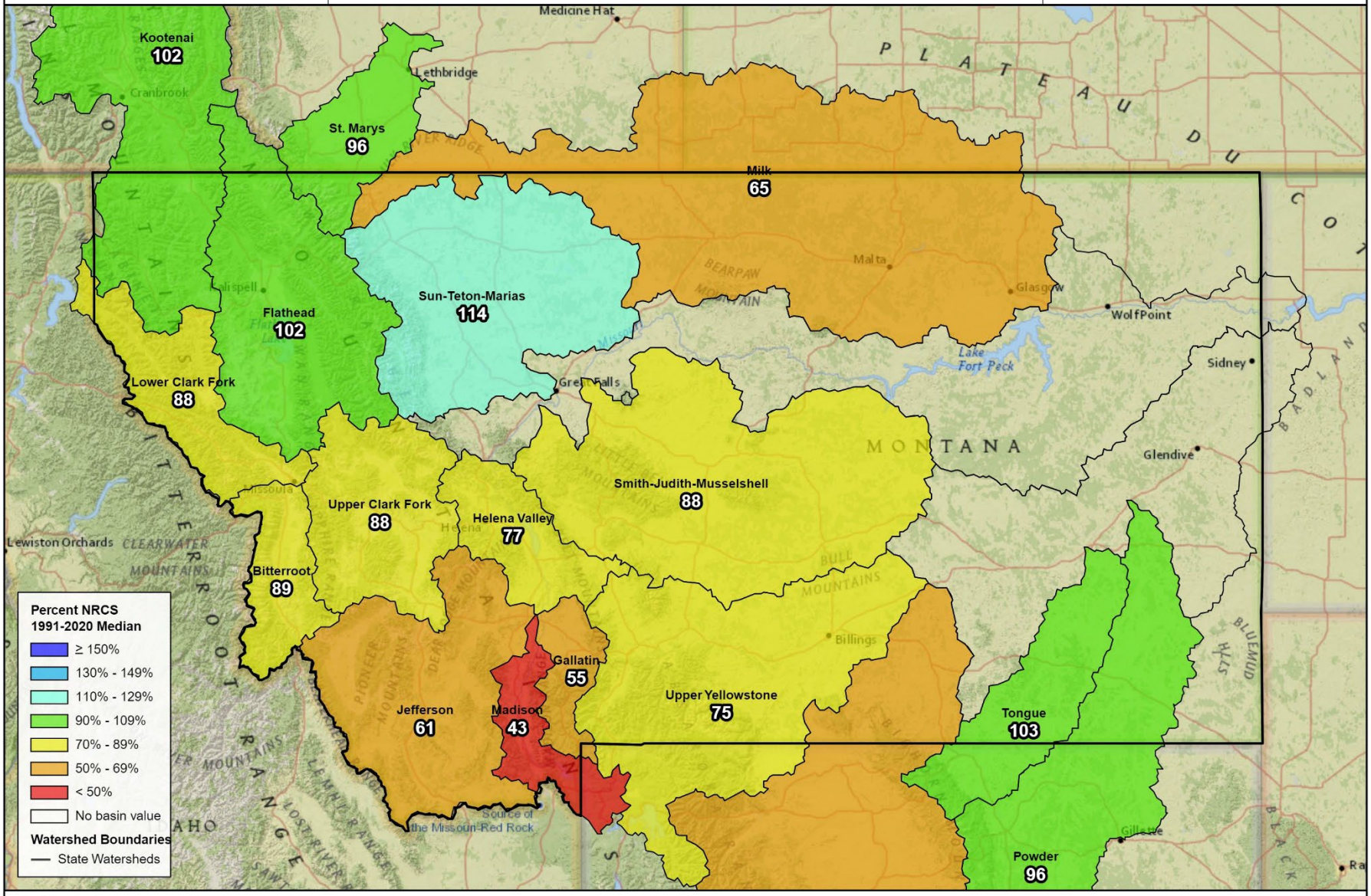
USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

Created 3-04-2022

1 month Precipitation	Monthly Precipitation Percent NRCS 1991-2020 Median	February 1, 2022 - February 28, 2022



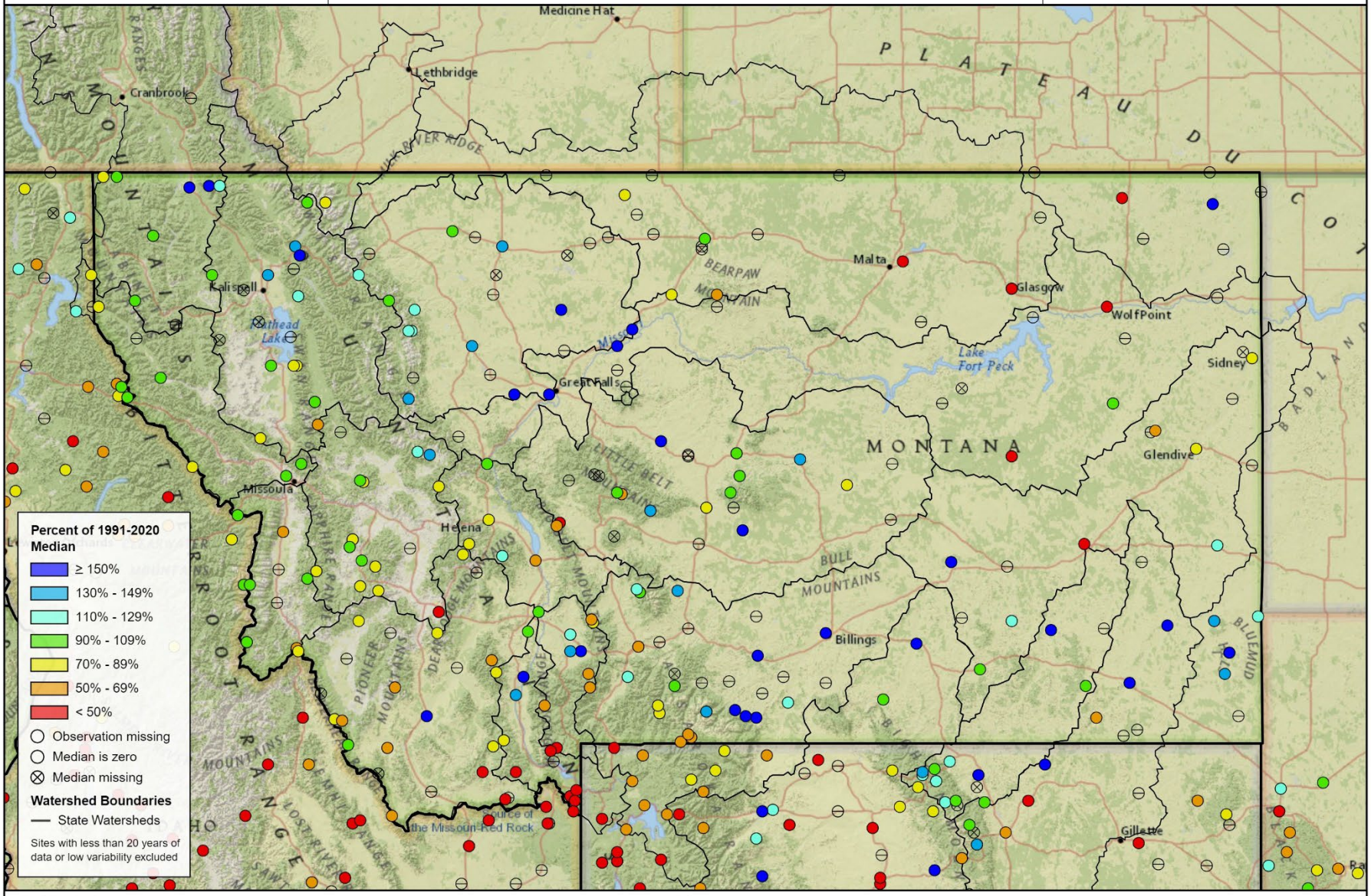
USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

Created 3-04-2022

1 month Precipitation	Monthly Precipitation Percent of 1991-2020 Median	February 1, 2022 - February 28, 2022



USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

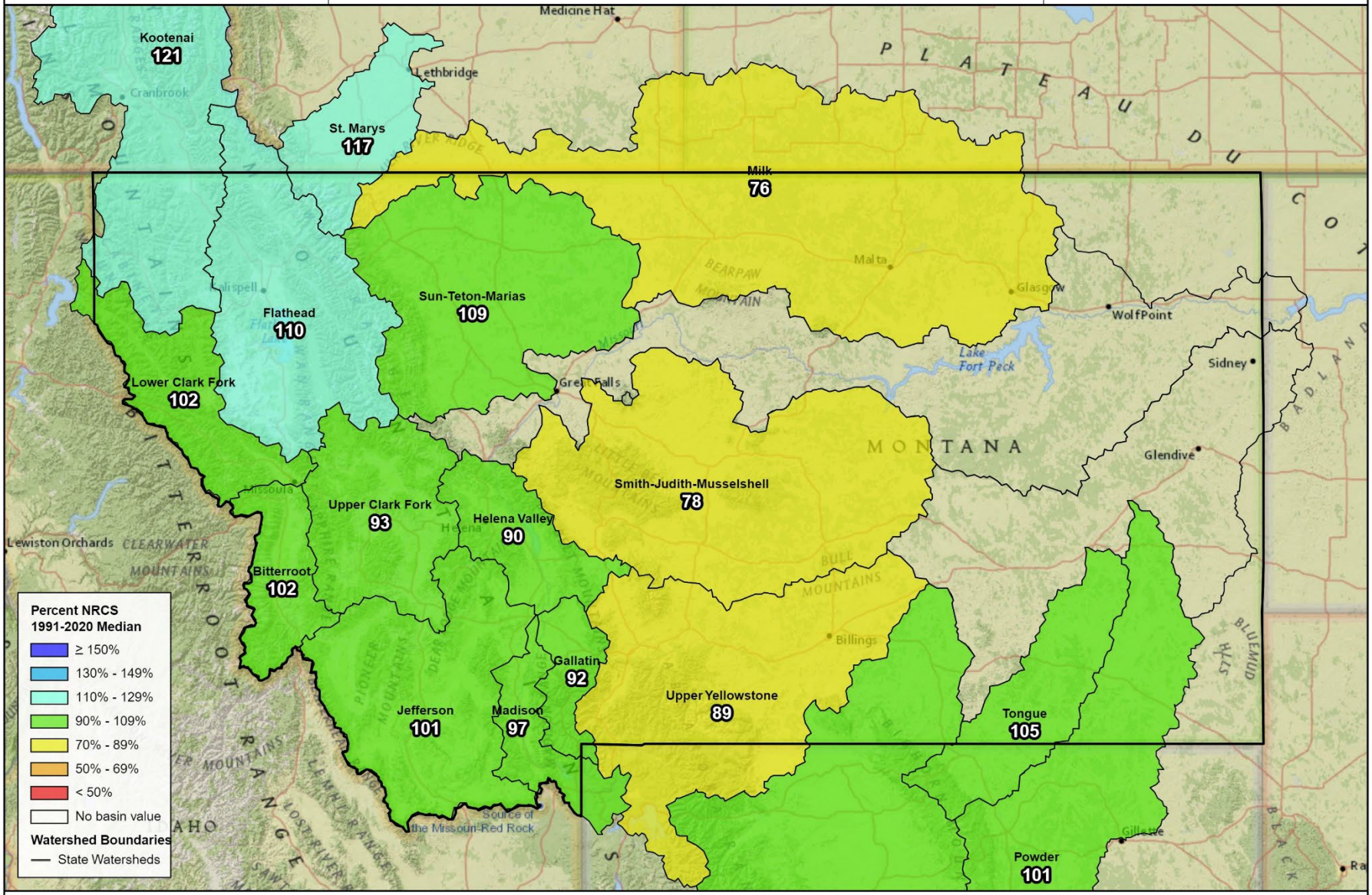
Created 3-04-2022

Water Year to Date Precipitation

Water Year Precipitation

Percent NRCS 1991-2020 Median

October 1, 2021 - February 28, 2022



USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

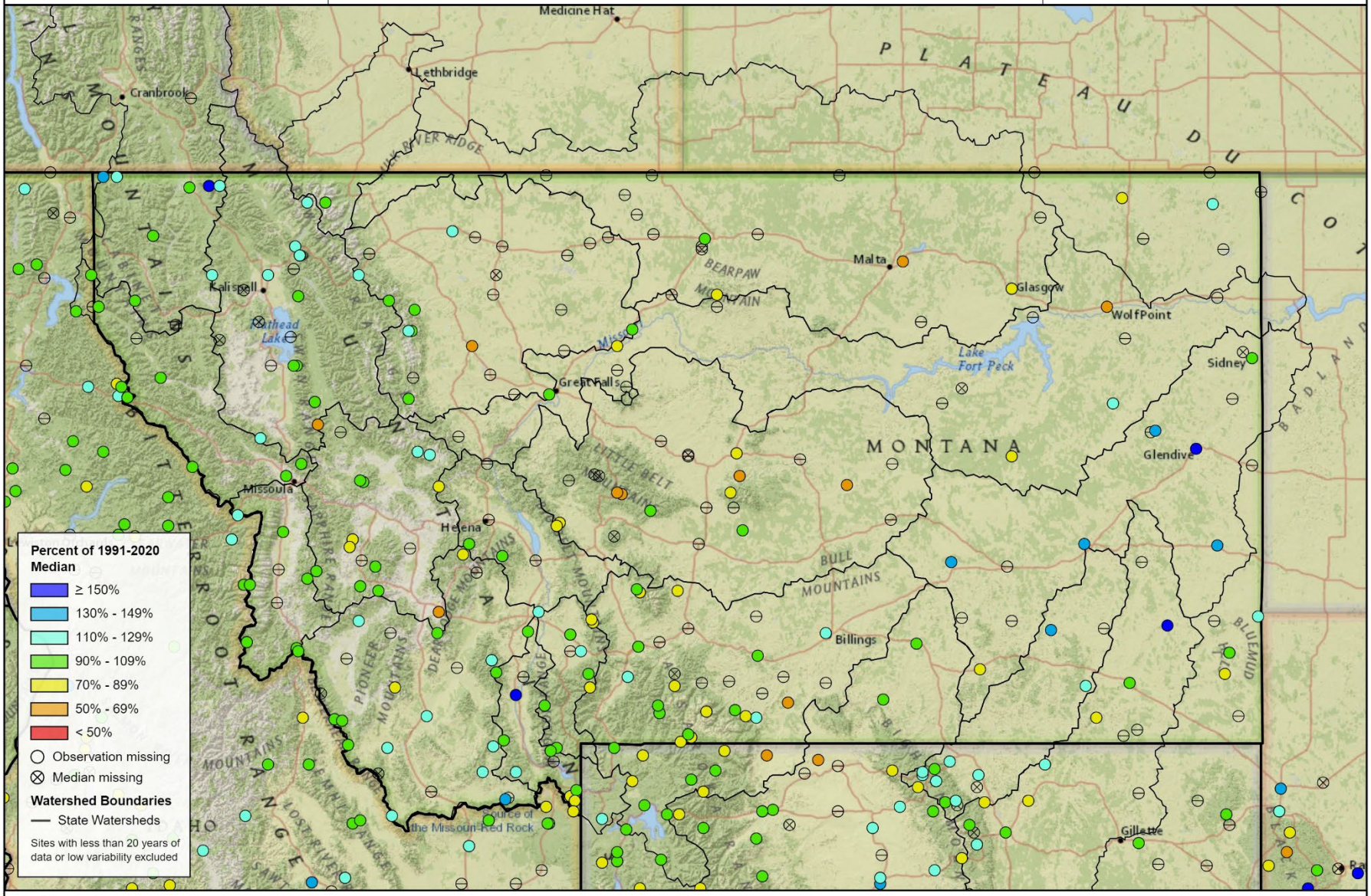
Created 3-04-2022

Water Year to Date Precipitation

Water Year Precipitation

Percent of 1991-2020 Median

October 1, 2021 - February 28, 2022



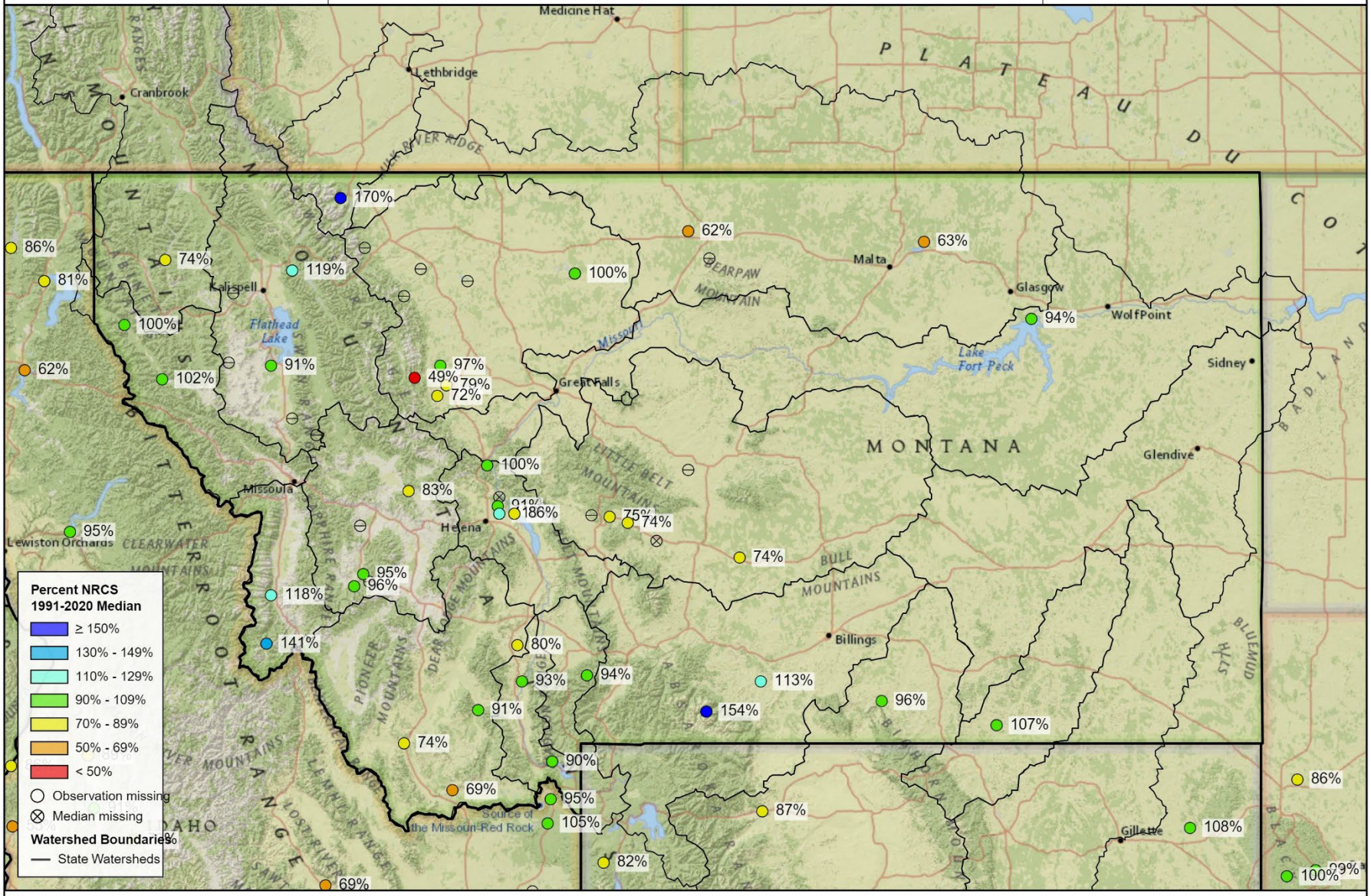
USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

Created 3-04-2022

Reservoir Storage	Reservoir Storage Percent NRCS 1991-2020 Median	March 1st, 2022



USDA Natural Resources Conservation Service
United States Department of Agriculture

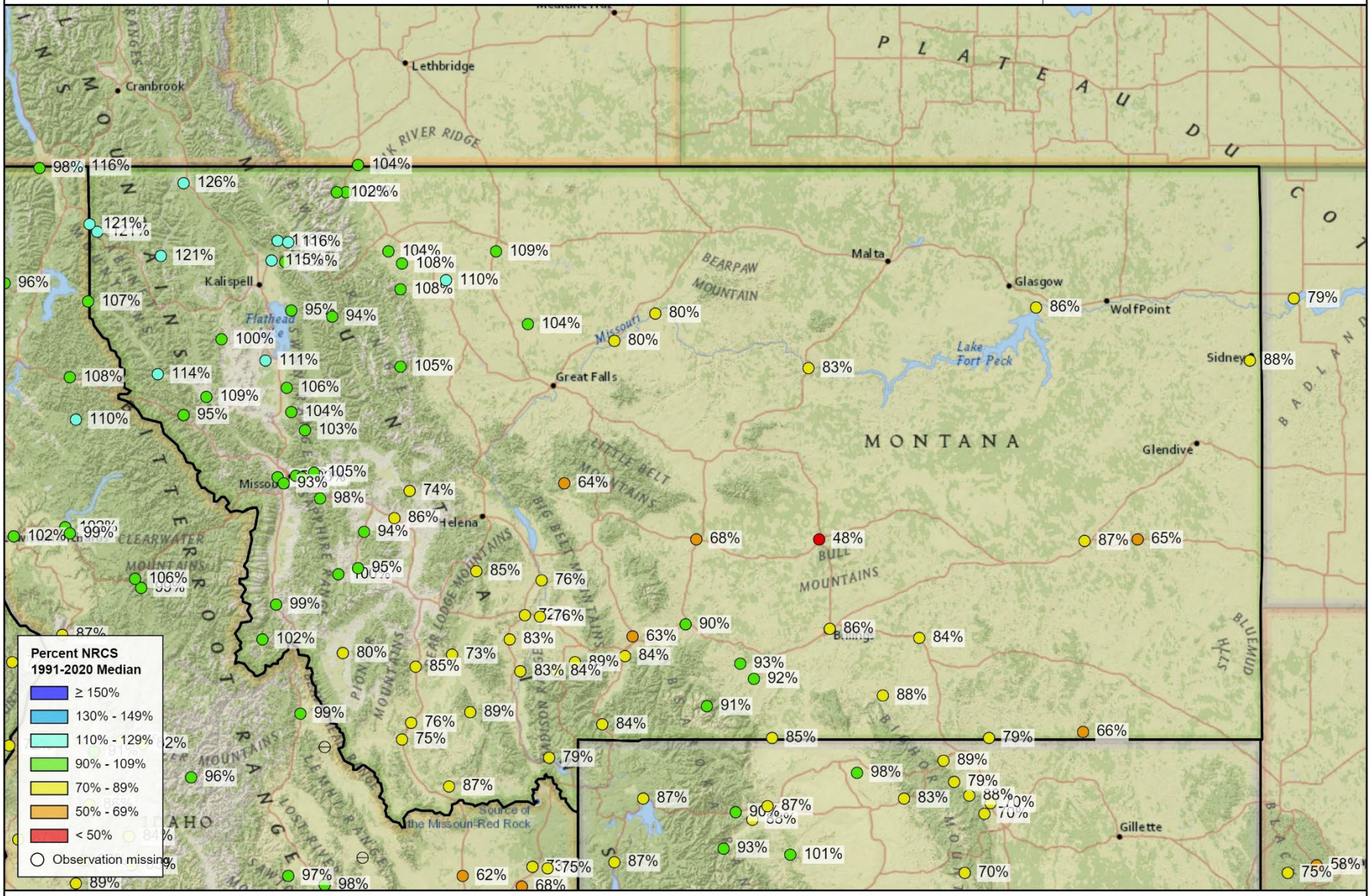
Created 3-04-2022

Forecast Volume,
50% Exceedance Probability

Streamflow Forecasts: April 1st - July 31st, 2022

Percent NRCS 1991-2020 Median

Primary Period, March 1, 2022



Percent NRCS 1991-2020 Median

- ≥ 150%
- 130% - 149%
- 110% - 129%
- 90% - 109%
- 70% - 89%
- 50% - 69%
- < 50%
- Observation missing

USDA Natural Resources Conservation Service
United States Department of Agriculture

N

0 20 40 80 120 160 200 Miles

Created 3-04-2022

WSOR Web Page Access

The links below will take you to web pages dedicated to the individual river basins and statewide overview for presenting the monthly data. Users are encouraged to interact with the maps presented, select different maps using the drop-down menu, and hover over or click on points or basins of interest to view data and plots.

Monthly Data - Interactive Web Pages		
Monthly Data - Statewide Overview		
Monthly Statewide Overview		
Monthly Data - River Basin Summaries		
Columbia River Basin	**Missouri River Basin**	**Yellowstone River Basin**
Kootenai	**Jefferson**	**U. Yellowstone**
Flathead	**Madison**	**Wyoming**
Upper Clark	**Gallatin**	
Bitterroot	**Helena Valley**	
Lower Clark	**Smith-Judith**	
	Sun-Teton	
	St. Mary	
	Milk	

Issued by:

Terry Cosby
Chief
Natural Resources Conservation Service
U.S. Department of Agriculture

Released by:

Tom Watson
State Conservationist
Natural Resources Conservation Service
Bozeman, Montana

Report Created by:

Montana Snow Survey Staff
10 East Babcock St, Room 443
Bozeman, MT 59715
Email: mt-nrcs-snow@usda.gov

Montana Water Supply Outlook Report

Natural Resources Conservation Service